MIRAGE G4.1 OWNER'S MANUAL

MIRAGE HARNESS AND CONTAINER SYSTEMS WERE APPROVED UNDER FAA TSO C-23b AND THE LOW SPEED CATEGORY OF NAS-804, AND ARE REQUIRED TO BE LABELED:

LOW SPEED PARACHUTE

LIMITED TO USE IN AIRPLANES UNDER 150 MPH

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2 - INTRODUCTION

Congratulations on your purchase of a Mirage harness and container system! We feel that the Mirage is the finest harness and container system available today and hope that you will agree. With proper use and care, it should provide many years of service. It is our sincere wish that your Mirage exceeds your expectations.

This manual is intended as a guide for the use and care of your Mirage, but is not a substitute for proper training in sport parachuting (skydiving) techniques or emergency procedures. Before using your Mirage, seek professional instruction from a qualified instructor familiar with its features.

Assembly and packing instructions for the reserve parachute are included as a guide for use by an appropriately rated senior or master parachute rigger, or foreign equivalent.

If you have any questions about your new Mirage, please contact us.

MIRAGE SYSTEMS, INC.
P.O. BOX 820
DELAND, FL 32721-0820
386-740-9222
sales@miragesys.com

3 - WARNING

WARNING!

SPORT PARACHUTING (SKYDIVING) IS A HAZARDOUS ACTIVITY WITH INHERENT RISKS THAT CAN RESULT IN INJURY OR DEATH!

BEFORE USING A MIRAGE HARNESS AND CONTAINER ASSEMBLY:

Read and understand this warning.
Read and understand the contents of this manual.
Complete a course of instruction in the proper use and functioning of your Mirage.

NOTHING ABOUT SPORT PARACHUTING (SKYDIVING) SHOULD BE CONSIDERED "SAFE".

Training, current experience, and properly maintained equipment may lessen the risks involved, but all risk cannot be eliminated. **You can be injured or killed even if your equipment works properly and you do everything right.**

IF YOU ARE NOT WILLING TO ACCEPT ALL OF THE RISKS INVOLVED IN SPORT PARACHUTING (SKYDIVING), YOU SHOULD NOT ATTEMPT TO PARTICIPATE.

Parachutes can, and do, malfunction even though they are properly designed, tested, manufactured, assembled, packed, maintained and used. If you are not prepared to accept the possibility that your Mirage, or any of its components, may malfunction and possibly cause you to be injured or killed, you should reconsider participation in sport parachuting (skydiving).

If you use a Mirage, or allow others to use your Mirage, you are acknowledging the fact that sport parachuting (skydiving) is a hazardous activity and that there is a possibility that your Mirage and any of its installed components may malfunction, resulting in the injury or death of the user.

4 - OPERATING LIMITS

Parachutes, like airplanes, have operating limits that have been established through testing.

Mirage parachute harnesses are approved for manufacture by the FAA under Technical Standard Order (TSO) C-23b and the "Low Speed Category" of National Aerospace Standard (NAS)-804.

As required by NAS-804, a series of static Line drop tests were made at the following airspeeds and payload weights to subject the harness to the required minimum of 3000 pounds of shock load. Mirage harnesses passed testing to these standards.

100 MPH……..750 LBS.
125 MPH……..525 LBS.
(130 kts) 150 MPH……..375 LBS. (170 kg)
175 MPH……..300 LBS.
200 MPH……..235 LBS.
225 MPH……..200 LBS.

NAS-804 sets the maximum operating speed of a "Low Speed Parachute" at 150 MPH, even though the assembly could withstand higher speeds at a lower weight, or higher weights at lower speeds, and still remain within the tested range.

To lower the risk of equipment failure, injury, or death, never exceed 150 MPH (130 kts) when opening the main or reserve parachutes of your Mirage.

Mirage harness and container systems are required to be labeled "LOW SPEED PARACHUTE LIMITED TO USE IN AIRPLANE UNDER 150 MPH". This label is located inside the reserve container pin cover flap of your Mirage.

RESERVE PARACHUTE COMPATIBILITY

Mirage Systems, Inc. authorizes the installation of any ram-air reserve parachute canopy approved for manufacture by the FAA under TSO C-23b, TSO C-23c, TSO C-23d, and TSO C-23f, **if it has been inspected and determined to be airworthy by the installing rigger, and is used within the limits of the "Low Speed Category" of NAS-804.**

For a single-harness parachute system, the strength of the harness must always be equal to or greater than the maximum force generated by the canopy during certification tests. **Therefore, a reserve parachute installed in a Mirage is restricted to use within the "Low Speed Parachute" operating limits of the Mirage harness and container system.**

DETERMINING MAXIMUM OPERATION LIMITS

The maximum operating weight and maximum operating speed of a reserve parachute must be determined before installation in a Mirage. This information is marked on the TSO label of reserve parachutes manufactured under TSO-C-23c, TSO-C-23d, and TSO-C23f.

Since a Mirage is approved as a "Low Speed Parachute" assembly, the maximum operating weight with a reserve parachute installed is 375 pounds (170 kg), *unless the maximum operating weight of the reserve parachute is lower***. Use the LOWER maximum operating weight. Maximum operating weight includes the weight of the jumper plus all equipment.**

The maximum operating speed of a Mirage is 150 MPH (130 kts), *unless the maximum operating speed of the reserve parachute is lower***. Use the LOWER maximum operating speed.**

The rigger who assembles the system should record the *lower of both numbers* as the "Operating Limits" in a place accessible to the user when he or she dons the rig. This will ensure that the parachute system is operated within the tested limits of NAS-804. Writing the operating limits on the reserve packing data card is acceptable.

EXAMPLE

A reserve parachute canopy approved for manufacture under TSO C-23c Category C has a maximum operating weight of 254 lbs. (115 kg) and a maximum operating speed of 175 Kts (201.39) MPH.

Installed in a Mirage, the maximum operating weight of the complete assembly would then be 254 lbs. (115 kg) and the maximum operating speed would be 150 MPH (130.34 kts).

5 - SERVICE LIFE

The Federal Aviation Administration (FAA) considers the service life of an approved parachute to be a non-regulatory requirement.

Mirage Systems, Inc. has not established a service life for its products, and there is no requirement under FAA TSO C-23( ) to set a service life for approved parachutes or components.

An appropriately rated parachute rigger is responsible for determining the airworthiness of the entire assembly each time the reserve parachute is repacked. In effect, the rigger packing the reserve parachute is extending the service life of the entire assembly in 180 day intervals each time he/she signs the packing data card and affixes a seal to the reserve parachute.

If there are any questions or concerns about the airworthiness of a Mirage, contact Mirage Systems, Inc. to arrange an inspection.

NOTE

Mirage Systems, Inc. does not repair, manufacture parts, or maintain patterns for Mirage harness and container systems made prior to May of 1998 by "Sky Supplies, Inc." or "The Annex, Inc.". Mirage replacement parts made for the RTS, G3, and G4.1 are not compatible with the assemblies made by "Sky Supplies, Inc." or "The Annex. Use of new parts made by Mirage Systems, Inc. in the older assemblies is not authorized.

LIMITED LIFE COMPONENTS

The components of any device tend to wear out after repeated use, and the fabric materials in your Mirage are no exception. Experience has proven that some fabric components are subject to more wear than others and need to be inspected frequently, and replaced periodically. These items are considered to be Limited Life Components.

The following Limited Life Components should be checked often and replaced periodically. The service life of these components is a recommendation based upon experience:

- Main Risers – Type 17 main risers should be replaced every 200 to 400 jumps. Type 8 risers should be replaced every 300 – 500 jumps. All risers - Check the Type IIA fabric loops often since they can be easily damaged and are subject to accelerated wear. Replace risers if Type IIA loops are frayed, or if webbing is damaged.

- Main Pilot Chute - Replace every 200 to 400 jumps or sooner if damaged or excessively worn.
- Main Deployment Bag - Replace every 300 to 500 jumps or sooner if damaged or excessively worn.
- Harness Leg Straps and Chest Strap - Replace when frayed or damaged, or if slipping excessively through hardware adjusters.
- Spandex Main Pilot Chute Pouch - Replace when torn or excessively worn.
- Main and Reserve Closing Loops – Replace when frayed.
- Reserve Deployment Bag Safety Stow – replace if nylon covering of shock cord is frayed, or if rubber strands inside break.

6 - SERVICE BULLETINS

Service Bulletins are issued by a manufacturer to notify their customers of a product improvement. The contents of a Service Bulletin are advisory in nature.

The following Service Bulletins have been issued by Mirage Systems, Inc., and are currently in effect:

Number	Date Issued	Subject
12-04	December 2004	AAD Cutter Location Change
06-11	June 2011	Recission of SB 03-11
06-11-2	June 2011	Installation of an AAD in a Mirage

There may be Product Service Bulletins issued by other manufacturers that affect your Mirage harness and container system. Check with the manufacturer of your reserve parachute canopy and Automatic Activation Device (AAD) for any current service bulletins relating to their products.

7 – RIGGING REQUIREMENTS

Within the United States or its territories, assembly and packing of the Mirage reserve parachute and its components must be accomplished by a certified and appropriately rated FAA Senior or Master Parachute Rigger who is familiar with packing ram-air sport parachutes.

In the U.S., your reserve parachute must be inspected and repacked by an appropriately rated FAA Senior or Master Parachute Rigger every 180 days.

Mirage recommends that the main parachute be assembled by an appropriately rated FAA Senior or Master Parachute Rigger. See FAA Advisory Circular 105-2E for guidance on who may pack the main parachute.

Outside of the U.S., assembly and packing of either parachute must be accomplished by a rigger holding an appropriate rating equivalent in training and experience to an FAA Senior or Master Parachute Rigger, as required by the governing regulations in the country where the assembly and packing takes place.

Outside the U.S., follow the regulations governing how often a reserve parachute must be inspected and repacked in the country where the repack takes place.

It is always a good idea to have a rigger inspect your Mirage between repacks if you have reason to suspect contamination, wear, or damage.

8 - AUTHORIZED COMPONENTS

The Mirage harness and container system was tested in accordance with TSO C-23b and National Aircraft Standard (NAS)-804 as a complete assembly. **Installation or substitution of components not authorized by Mirage Systems, Inc. is prohibited.**

Do not install a reserve parachute of lesser or greater pack volume than the intended design criteria of the Mirage reserve container being packed.

"Round" reserve parachute canopies are not authorized.

The following components are authorized for installation:

- Ram-air reserve parachute canopies manufactured under TSO C-23b, TSO C-23c, TSO C-23d, and TSO C-23f. **See "Reserve Parachute Compatibility" in "Operating Limits".**

- An Automatic Activation Device (AAD) evaluated by Mirage Systems and listed on the Mirage "Authorized AAD List".

The substitution of any of the following components with a component not manufactured by Mirage Systems, Inc. is NOT AUTHORIZED:

- Reserve parachute deployment bag and bridle
- Reserve pilot chute
- Reserve ripcord
- Reserve static line (RSL)
- Trap system components (RSL, Trap Line, Main Risers)

9 - INSTALLING AN AUTOMATIC ACTIVATION DEVICE (AAD)

Installation of an AAD in a Mirage is OPTIONAL. Install and use at your own risk.

If installing an AAD in a Mirage made before December of 2004, verify that AAD cutter has been relocated to the No. 3 reserve container flap in compliance with Mirage Product Service Bulletin 12-04.

Initial installation of an AAD may be easier to accomplish before the reserve canopy has been installed.

Before installing an AAD, complete the following tasks:

- Read and understand the notice concerning AAD installation in this manual.
- Verify that the AAD model is on the Mirage "Authorized AAD List" contained in this manual.
- Review and comply with any AAD manufacturer Product Service Bulletins that may be in effect.
- Verify that AAD batteries and/or periodic servicing are "in date", according to the AAD manufacturer's guidelines.
- Perform any checks recommended by the AAD manufacturer prior to installation.
- Record the required data on the packing data card for the AAD.

NOTICE!

To the Owners, Users, and Riggers of Mirage Systems, Inc. products:

Install and Use an Automatic Activation Device (AAD) at Your Own Risk!

If you install an AAD in your Mirage, you are acknowledging the fact that sport parachuting (skydiving) is a hazardous activity and that there is a possibility the AAD may not operate as designed to save your life.

FAA Advisory Circular AC-105-2E, dated 12/4/13, permits the installation of Automatic Activation Devices (AADs) in approved parachute assemblies.

The approval to install an AAD by the FAA is based upon AAD operation not interfering with the normal functioning of the parachute.

An Automatic Activation Device (AAD) is an optional self-contained mechanical or electromechanical device whose design, manufacture, testing, and operational reliability are not regulated by the Federal Aviation Administration.

The FAA has not established Minimum Operational Performance Standards (MOPS) or a Technical Standard Order (TSO) for AADs. Likewise, there is no mandatory industry standard of testing or operational reliability established that all AAD designs must meet.

An AAD can fail to operate as designed for a variety of reasons. Mirage Systems, Inc. cannot be held responsible for the operational reliability of an installed AAD. Mirage Systems, Inc. does not design, manufacture, test, or guarantee AADs, and has no control over their maintenance or use in the field. **The functional reliability of an AAD was not tested during the TSO approval process of any Mirage harness and container assembly.**

Installation and use of any AAD in a Mirage harness and container assembly is at the sole risk of the owner.

AADs are strictly backup devices and are not intended to replace training or timely manual execution of emergency procedures.

AADs may, or may not, initiate deployment at a sufficient altitude to allow the reserve parachute to open, depending upon various combinations of circumstances.

When using an AAD with a pyrotechnic cutter in your Mirage reserve container, the closing loop passes through the cutter assembly. Cutting of the closing loop releases the reserve pilot chute to begin parachute deployment. When initiated by the AAD, reserve parachute deployment is totally dependent upon the cutter assembly working as designed by the AAD manufacturer.

Users should be aware that there is a possibility that the closing loop may not be cut at all, the closing loop may be only partially cut through, or the closing loop could be trapped in the cutter. **Either of these failures could delay or prevent reserve parachute deployment.**

There is also a possibility that a partially cut closing loop could fail later, causing a dangerous premature deployment of the reserve parachute. *At least one such incident has been reported.*

If an AAD works as designed, it will not interfere with the normal operation of the reserve parachute. However, Mirage owners should note that current designs of pyrotechnic cutters used in AADs do not include a "fail-safe" mechanism to guarantee that a defective cutter cannot interfere with the manual operation of the reserve parachute, as required in FAA AC-105-2E. *Trapping of the reserve closing loop within the AAD cutter could possibly interfere with the immediate release of the reserve pilot chute, even if the ripcord is manually pulled.*

Owners and users of Mirage Systems, Inc. products are encouraged to weigh the potential hazards of installing and using an AAD against the potential consequences of not having an AAD installed, and to make their own decision, based upon the information contained in this notice, Mirage Product Service Bulletin, 06-11-2, dated 24 June 2011, and FAA Advisory Circular AC105-2E, dated 12/4/13 .

AUTHORIZED AAD LIST

This list may be revised if new AAD models become available, or if current models become obsolete.

To prevent unauthorized field modifications that may invalidate the TSO, Mirage harness and container systems are manufactured with the components required for the installation of common AAD designs using pyrotechnic loop cutters. This is permitted by the FAA in AC-105-2E, even though an AAD is not installed.

Mirage Systems, Inc. authorizes the installation of an AAD utilizing a pyrotechnic loop cutter based solely upon its *operational compatibility* with our harness and container system, and NOT the *operational reliability* of the AAD.

Only AADs that have been evaluated by Mirage Systems, Inc. to determine their operational compatibility with our products may be installed.

OPERATIONAL COMPATIBILITY DOES NOT DETERMINE THAT AN AAD WILL WORK AS DESIGNED, BUT ONLY THAT IT CAN BE INSTALLED AND OPERATED WITHOUT FURTHER MODIFICATION TO A MIRAGE HARNESS AND CONTAINER SYSTEM.

MIRAGE SYSTEMS, INC. DETERMINES THE OPERATIONAL COMPATIBILITY OF AN AAD BASED SOLELY UPON THE FOLLOWING CRITERIA:

- **The AAD will fit into the retaining pouch provided in the reserve container.**
- **The electrical cables are sufficiently long.**
- **The operating controls are accessible when installed.**
- **The closing loop cutter will fit into the elastic keeper provided.**

The following Automatic Activation Devices (AADs) utilizing pyrotechnic cutters have been evaluated by Mirage Systems, Inc. solely to determine their *operational compatibility* with Mirage G3, G4.1 and RTS harness and container assemblies, and are APPROVED for installation:

Brand	Model	Manufacturer
ARGUS	One Pin	Aviacom, SA/ NV
CYPRES 2	One Pin (Student, Expert, Speed, Multi)	Airtec, GmbH
M2	One pin (Student, Expert)	MarS a.s.
VIGIL I, II, 2+	One Pin	AAD sa/nv

Authorization is NOT based upon the ***operational reliability of the AAD*****. If you have a question concerning the operational reliability of your AAD, contact the AAD manufacturer.**

Check with the manufacturer of your AAD for any current Product Service Bulletins.

Note: The CYPRES loop and disc system, (with or without silicon treatment) is not to be used in combination with other AADs. See CYPRES Safety and Rigging Notice 20110421, April 21, 2011.

If you have questions about your Mirage, contact:
Mirage Systems, Inc., P.O. Box 820, Deland, FL, 32721, USA. 386-740-9222.

To install an AAD in a Mirage:

1.Wrap the excess control unit and cutter assembly wiring around the perimeter of the processing unit and place it into the spandex pocket located on the bottom flap of the reserve container. Note that the wires exiting the processing unit are nearer to one side. Place this side against the bottom flap. A small rubber band may be useful in keeping the wires in place on the processing unit.

Note

There are two types of AAD pockets used in Mirage containers. One features openings in the corners of the closing flap that the control unit wire cable and the cutter assembly wire should be passed through, and the other has a strip of velcro for the closing flap that the wires must pass under.

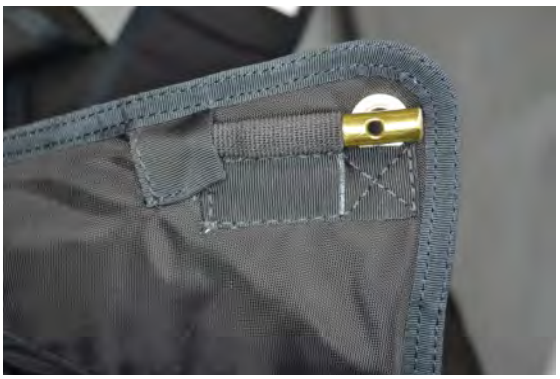
2.Pass the control unit through the opening provided in the reserve pack tray.

3.Route the control unit and wire cable through the pack tray, exiting at the top right, as shown. Make sure to leave slack in the wire cable to prevent pulling the control unit out of the spandex pocket when the reserve is packed.

4.Place the control unit into the spandex pocket provided on the back pad. The display must be visible through the clear vinyl window.

5.Thread a pull-up cord through the elastic AAD cutter keeper and through the reserve bottom flap, exiting the slit provided near the AAD spandex pouch. “Super-tack” or Cypres loop material works well for this and is provided on new assemblies.

6.Tie the AAD cutter assembly to the pull-up cord and pull it through the No. 3 flap and into the elastic cutter keeper. Leave enough slack in the wire to prevent strain on the cutter when the reserve is packed. Remove the pull-up cord.



7. Align the hole in the cutter assembly with the grommet of the No. 3 flap.

8. Close the cover on the AAD pocket.

10 – INSTALLING THE RESERVE PARACHUTE CANOPY

Before installing a reserve canopy in a Mirage, complete the following tasks:

- Check the canopy label to verify that the canopy is manufactured under an FAA TSO C23( ) and is clearly marked.
- Read and understand the Operating Limits section of this manual.
- Determine the operating limits of the entire assembly and record on the packing data card.
- Review any manufacturer Product Service Bulletins and/or FAA Airworthiness Directives that may be in effect for this canopy.
- Thoroughly inspect the canopy and lines for airworthiness.
- Record the required data on the packing data card for the reserve canopy and Mirage harness and container system.

Lay the Mirage out face down with the reserve risers extended fully. The rear risers will be facing up. Make sure that the risers are not twisted.

Attach the reserve parachute canopy to the reserve risers, routing the four line groups to their correct riser. Perform a thorough suspension line continuity check after installation. Use of either Rapide Links or Slinks to attach the reserve parachute canopy suspension lines to the risers is authorized in accordance with the canopy manufacturer's recommendations.

Follow reserve parachute canopy manufacturer's instructions for assembling Slinks.

Tacking through the risers to keep the Slinks tabs centered within the riser loops is authorized. Take care not to tack through the Slink line or the tab. Tack in a way that no strain is placed on Slink or its tab during deployment.

When installing Rapide Links, installation of vinyl tubing or fabric slider stops is authorized if recommended by the canopy manufacturer.

Route the left and right reserve parachute canopy steering lines through their corresponding guide rings on the rear reserve risers and attach the toggles to the steering lines in a manner recommended by the canopy manufacturer. Toggles are attached at the point marked on the steering lines by the canopy manufacturer. Perform a continuity check after installation.

11 - INSTALLING THE RESERVE DEPLOYMENT BAG AND PILOT CHUTE

Substitution of the Mirage reserve deployment bag and/or reserve pilot chute with components made by another manufacturer **is prohibited**, and voids the TSO.

Check the TSO label on the reserve deployment bag to verify that it is the correct size and type for the Mirage reserve container.

Use of a Mirage G3 deployment bag in a Mirage G4.1 is prohibited.

G4.1 RESERVE DEPLOYMENT BAG IDENTIFICATION

Rig Size	Part Number	Bag ID
MZS, MXS, MOS	RBM01-G4.1-MZS, MXS, MOS	G4.1-XOS
MT, MO, MX	RBM01-G4.1-MT, MO, MX	G4.1-TOX
M1, M2	RBM01-G4.1-M1, M2	G4.1 - 1,2
M2S	RBM01-G4.1-M2S	G4.1 M2S
M3, M4	RBM01-G4.1-M3, M4	G4.1 - 3,4
M5, M6	RBM01-G4.1-M5, M6	G4.1 - 5,6
M7, M8	RBM01-G4.1-M7, M8	G4.1 - 7,8

Thoroughly inspect the reserve deployment bag and pilot chute for airworthiness.

Verify that the correct size safety stow is installed from the chart below.

DEPLOYMENT BAG SAFETY STOW FINISHED LENGTHS AND IDENTIFICATION CODES

Safety Stow Size	Finished Length	Thread Color Identification Code	Fits G4.1 Reserve D-bag Sizes
SMALL	5-3/4"	YELLOW	MZS, MXS, MOS, MT, MO, MX
MEDIUM	6-1/2"	BLACK	M1, M2, M2S, M3, M4, M5, M6
LARGE	7-1/4"	RED	M7, M8

Replacement safety stows are available from Mirage Systems, Inc.

ATTACH THE RESERVE PILOT CHUTE TO THE RESERVE DEPLOYMENT BAG

If an AAD is to be installed, the use of a Mirage reserve pilot chute with a concave top is mandatory. Older flat top Mirage pilot chutes are authorized only if an AAD is not installed.

Attach the reserve pilot chute to the reserve deployment bag by passing the looped end of the bridle through the two bridle loops on the reserve pilot chute.

Then pass the deployment bag through the looped end of the bridle, forming a larks head knot.

Center the larks head knot on the pilot chute bridle loops and cinch tight. Securing the larks head knot in place by hand tacking with safety tie thread is authorized, but not required.

12 - INSTALLING A RESERVE CLOSING LOOP

Mirage reserve containers are shipped with Cypres ® reserve closing loops installed. If a different brand of AAD is installed, remove and replace the Cypres® closing loop with one recommended by that AAD manufacturer.

NOTE

The Cypres® loop and disc system, (with or without silicon treatment) is not to be used in combination with other AADs. See Cypres® Safety and Rigging Notice 20110421, April 21, 2011.

CLOSING LOOP LENGTH

The correct closing loop length needed is always a balance between the proper compression of the reserve pilot chute and the ability to pull the ripcord. The loop needs to be short enough to compress the pilot chute so that the spring can't tilt, or move, inside the packed reserve, but yet long enough that the pull force required to move the ripcord pin remains under the 22 lb. maximum, as required by NAS 804.

The actual closing loop length required is affected by several factors, such as the size of the reserve canopy and the size of the Mirage reserve container, the experience of the rigger packing the Mirage, distribution of the canopy bulk within the reserve deployment bag, and even the climate where the reserve is being packed. A longer closing loop may be required if packing a reserve in a desert location, if the last repack was done in a humid location.

Before installing a rigger seal, we recommend that a ripcord pull-force test be done to verify that the ripcord pin can be moved with less than 22 lbs. of force.

Follow instructions from AAD manufacturer to secure the disc on the closing loop, and to determine the proper size for the loop opening.

Closing loop lengths vary for a variety of reasons this can include humidity, size of the canopy, and rigger experience. Average closing length is between 4.50" to 5.0"

Use the suggested lengths from the list below to begin. Measurements are from the end of the closing loop to the disc. All measurements are +/- 1/4" pre-stretched.

Canopy Size	Loop Length
PDR-99 /OP-106	4.0"
PDR-106/OP-113	4.0"
PDR-113/OP-126	4.0"
PDR-126/OP-143	4.50"
PDR -143/OP-160	4.50"
PDR-160/OP-176	4.75"
PDR-176/OP-193	4.75"
PDR-193/OP-218	5.0"
PDR-218/OP-235	5.0"
PDR-235/OP-253	5.25"

HELPFUL HINT

The proper closing loop length can be verified before the reserve container is closed.

Install a closing loop and thread the long pull-up cord through it. After placing the packed bag in the reserve container and V-folding the bridle, thread the long pull-up cord through the No. 1 flap grommet.

Push down on the No. 1 flap and the packed bag with one hand, and pull up with maximum effort on the long pull-up cord with the other. If the closing loop is the correct length, you should be able to pull ¾" to 1" of the loop past the No. 1 flap.

At this point if a length adjustment is needed, fold the No. 1 flap back and reach under the packed bag inside the reserve container to pull the closing loop disc and knot from under the retaining elastic and out the top of the reserve container. This can be done without disturbing the risers or packed parachute.

Make the length adjustment needed, then use the still attached pull-up cord to return the closing loop to the reserve container. Make sure the disc is reseated on the grommet under the retaining elastic. Recheck the closing loop length in the same manner.

13 – INSTALLING A RESERVE STATIC LINE (RSL)

"No Velcro" RSLs are used on all Mirage models manufactured after January 2008. Previous RSLs used velcro to attach the RSL to the left rear reserve riser.

A MIRAGE RSL IS OPTIONAL

The RSL on your Mirage G3, G4.1, or RTS is an optional accessory. All models are approved for use with the RSL installed, installed but not engaged, or not installed at all. Use of the RSL may not be desirable under all circumstances. If you are not sure if an RSL is right for you, get advice from a qualified instructor.

WARNING!

An RSL should not be relied upon to activate your reserve! Always pull your reserve ripcord when the main parachute is released, even if you think the RSL is engaged!

The RSL WILL NOT open the reserve parachute if **DISENGAGED** from the main riser. It also **MAY NOT FUNCTION AS INTENDED IF IMPROPERLY INSTALLED OR DAMAGED.** Your rigger should inspect it periodically for proper installation, wear, or damage. **Only RSLs made by Mirage Systems, Inc., are authorized for use on Mirage harness and container systems.**

HOW IT WORKS

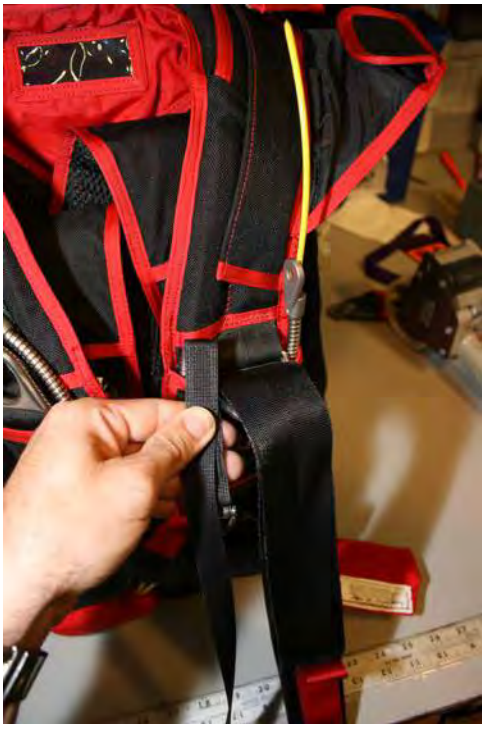
The RSL is a simple, passive system consisting of a short lanyard (static line) connecting the left main parachute riser to the reserve ripcord. When the main parachute is released, the RSL pulls the reserve ripcord shortly after the left riser leaves the harness ring.

A quick release shackle on the RSL allows the main parachute to be released without opening the reserve parachute. This feature is useful in certain situations, such as landing in high winds, breaking away from an entanglement with another parachutist, or for main parachute maintenance. Questions about how to use an RSL can be answered by a qualified instructor.

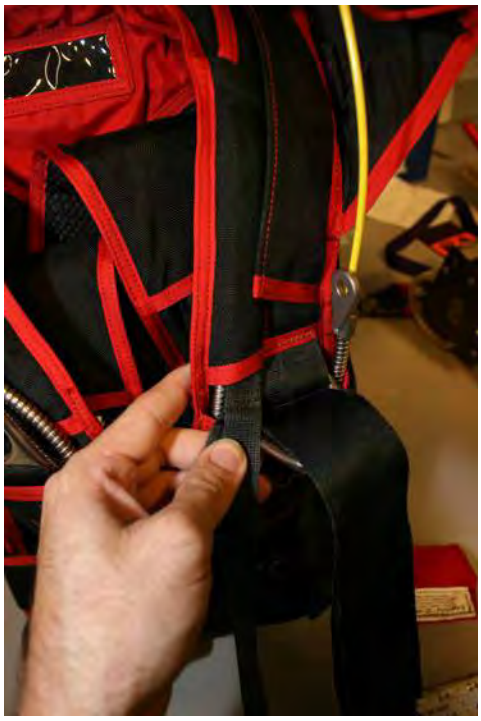
Mirage RSLs are made in three lengths, 23", 24", and 25". If your Mirage has a 25" or 26" ripcord, the correct RSL is 23" ; if it has a 27" or 28" ripcord, the correct RSL is 24"; and if it has a 29" or 30" ripcord, the correct RSL is 25" . Contact Mirage Systems, Inc. to determine the correct length ripcord to use if you have lost yours. You will need to provide the serial number of the rig.

The RSL consists of a short webbing lanyard with a quick release shackle at one end, and a small ring at the other. While a very small Velcro patch is needed to retain slack, none is exposed that could damage the rig.

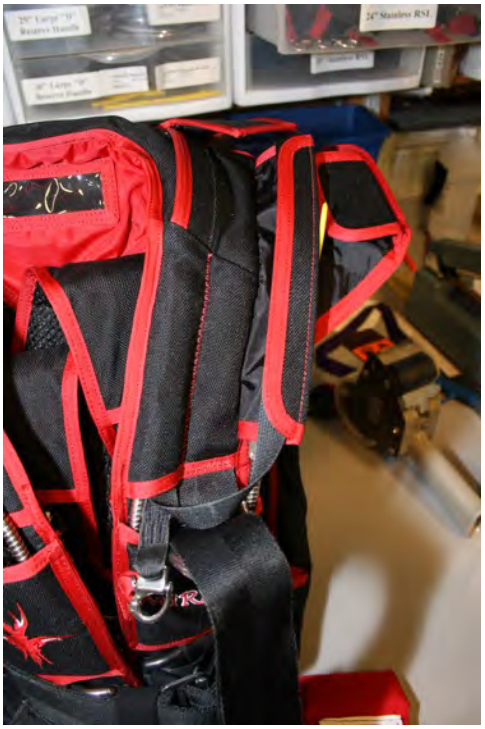
Installation of the RSL



To begin installation of the Mirage RSL, fold and press the Velcro patches together that are near the release shackle.



With quick release shackle down, insert folded RSL into ripcord housing channel.



The hook portion of the quick release shackle should be facing outboard, and the tab should be facing inboard. Loosely route the remaining RSL toward the reserve container. Remove any twists and place it under the flap on the RSL retainer.

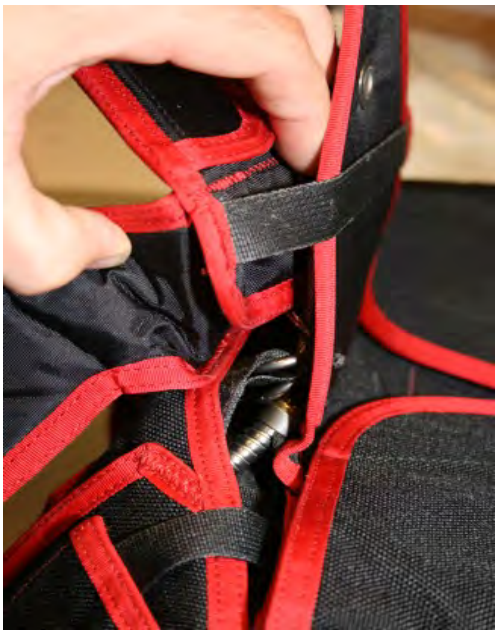
Close the RSL retainer. Remove any excess slack between the cover and the ripcord channel, but don't pull it too tight.

Route the RSL directly to the guide rings on the reserve pin flap. Be sure to remove any twists.

The ripcord cable must pass through the first guide ring, the RSL lanyard ring, and the second guide ring, after exiting the ripcord housing.

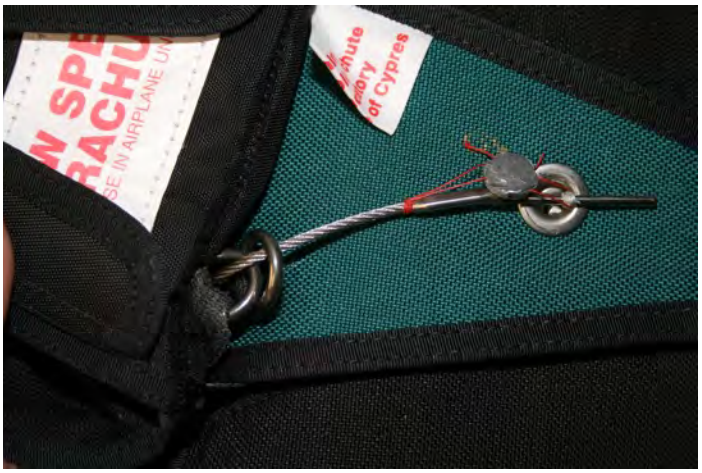
Neatly stow excess RSL lanyard between the yoke and the top of the reserve container. Don't pull tight.

Model G4.1 ONLY



Pass the ripcord pin flap through the retaining loop on the protector flap **AFTER** the RSL has been assembled.

When the reserve is packed, almost no RSL should be visible on the outside of the container.



Attach the quick release shackle to the ring provided on the riser. **Mirage RSLs were designed and tested to be used with risers made by Mirage only. The attachment ring location MUST BE BELOW the riser grommet. Risers made by another manufacturer may not have the attachment ring in the required location. Always have a qualified rigger inspect your risers to determine if they are compatible with the Mirage RSL.**

14 - PACKING THE RESERVE PARACHUTE

Riggers are to use standard rigging practices, techniques and tools in packing a Mirage reserve container. No special tools are required, other than a long pull-up cord, 60" (+/-) long. Refer to the information provided in this manual as a guide. If you have any questions, contact Mirage Systems, Inc.

NOTE

The use of a ratcheting closing tool is discouraged. Ratcheting closing tools can exert excessive force which can weaken or break the reserve container closing loop, damage reserve flap grommets, and possibly damage the AAD cutter. If you do use a ratcheting closing tool, do so carefully.

Lay the Mirage and reserve parachute canopy out for packing, face down and head toward the canopy.

When the canopy inspection and line continuity check are completed, fold the canopy according to the canopy manufacturer's instructions. The PRO packing method, or a BASE canopy type PRO packing method, is recommended.

When folding is complete, ensure that all suspension and steering lines are in the center of the folded canopy on top of the center cell, and that half of the canopy is folded to the right of the lines, and half of the canopy is folded to the left of the lines.

Long fold the canopy slightly wider than the closing flap of the reserve deployment bag and stow the slider as recommended by the canopy manufacturer.

Fold the slider and grommets back making an S-fold 3” to 6” top to bottom. The slider grommets should now be located at the bottom edge of the folded canopy.

The second S-fold brings the canopy stack down over the first S-fold even and even with the bottom edge. The length of the second S-fold will depend upon the available space between the bottom of the deployment bag and the closing loop grommet in the bag, but should be about 4” to 6” overall. This second fold should begin to create the desired wedge shape of the reserve container. The majority of the canopy bulk should now be at the bottom of the stack. This will end up in the bottom of the reserve bag, between the opening and the closing loop grommet.

For the next step, it may be helpful to have your knees against the bottom edge of the stacked canopy.

Spread the two sides of the remaining folded canopy apart slightly and locate the center seam. Follow the center seam toward the center cell intake, clearing the seam as you go, until the center cell intake is located. Fold the intakes left and right away from the center seam and gently roll the center seam down toward the floor, forming the folded canopy into a molar shape.

Unlike the G3, the G4 requires somewhat thicker molar ears in order to fill the top of the reserve container. Fold the molar ears under 5” to 8” .

Slide the deployment bag under the folded canopy and place your knees on the edge of the bag closing flap. Open the bag with one hand and with the other hand, slide one side of the folded canopy into the bag. Repeat for the other side. IMPORTANT – Fill the top of the bag as full as possible.

Close the bag opening by making two locking stows, left or right,with the suspension lines. Micro-line stows should be 2” long (+/-), and Dacron line stows should be 3” long (+/-). When the locking stows are completed, ensure that the zig-zag stitching on the safety stow is centered in the retention channel.

CAUTION!

Prior to stowing the suspension lines, always cover the hook velcro located inside the reserve deployment bag line stow pocket by attaching temporary pile velcro strips. Hook velcro can cause damage to the reserve canopy suspension lines. Remove temporary velcro after suspension lines are stowed.

Stand the bag on the floor with the closing flap up. S-fold the remainder of the suspension lines in the line stow pocket, starting in the bottom corners, left or right. Continue left or right until 4” (+/-) of the suspension lines remain outside the pocket. To reduce line bulk, evenly distribute the lines within the pocket.

Remove the temporary pile velcro and mate the velcro strips on the line stow pocket, making sure that no suspension lines are trapped between the two velcro halves.

While the bag is still standing with the closing flap up, use your hand to compress the packed canopy at the center of the closing flap. This will make a space for the AAD when the bag is placed in the reserve container.

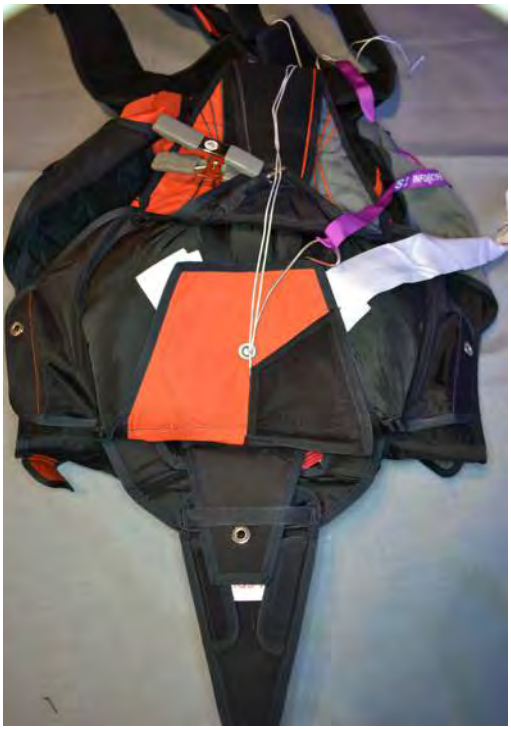
Install a 60” (+/-) long pull-up cord through the reserve container closing loop.

Lift the packed bag toward the reserve container and place the risers into the reserve container. Make sure not to twist or rotate the bag. Spread out the four risers side-by-side across the bottom of the reserve container. Neatly organize the 4” to 6” of slack suspension lines between the bag and risers.

Lay the reserve bag in the container and thread the pull-up cord through the grommet in the bag.

Place your knee on the center of the bag to keep it in place while you push the bag into the corners of the reserve container, filling the corners. With both hands, press inward on the bottom center of the bag to make room for the AAD while pushing the bag downward into the corners of the reserve container.

Starting at the bridle attachment point on the bag, V-fold the bridle as shown, removing any twists in the bridle. Fold all but 3’ to 4’ of the bridle in this manner. Bridle folds should be evenly distributed to the left and right of the closing loop grommet.



Thread the long pull-up cord through the grommet in the No. 1 flap and close the flap over the folded bridle. Make sure the folded bridle is kept away from the grommets. The remaining 3’ to 4’ of bridle should exit from under the bottom edge of the No. 1 flap, left or right of the grommet.

HELPFUL HINT

At this point, the proper closing loop length can be verified before the reserve container is closed.

Push down on the No. 1 flap and the packed bag with one hand, and pull up with maximum effort on the long pull-up cord with the other. If the closing loop is the correct length, you should be able to pull ¾" to 1" of the loop past the No. 1 flap.

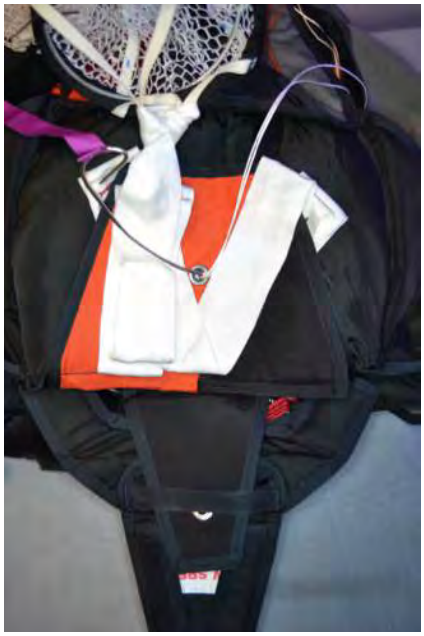
If a length adjustment is needed, fold the No. 1 flap back and reach under the packed bag inside the reserve container to pull the closing loop disc and knot from under the retaining elastic and out the top of the reserve container. This can be done without disturbing the risers or packed parachute.

Make the length adjustment needed, then use the still attached pull-up cord to return the closing loop to the reserve container. Make sure the disc is reseated on the grommet under the retaining elastic. Recheck the closing loop length in the same manner.

Pin the closing loop through the No. 1 flap with a temporary packing pin.

HELPFUL HINT

Place your knee or foot on the center of the No. 1 flap and apply pressure while pulling up on the No. 4 and No. 5 reserve container side flaps. Work the canopy into the corners of the container and away from the closing loop. This is important for bulk distribution and proper pilot chute seating.



Fold the remaining 3' to 4' of bridle left to right across the No. 1 flap below the grommet.

HELPFUL HINT

A long wire bodkin or rifle cleaning rod is helpful for the next step.

Thread the long pull-up cord through the reserve pilot chute base and out through the grommet in the top of the pilot chute.

If an AAD is to be installed, use of a Mirage reserve pilot chute with a concave top is required. Older Mirage reserve pilot chutes with a flat top are authorized only if an AAD is not installed.

CAUTION!

Make sure that the pull-up cord passes through the center of the pilot chute spring and does not pass around or through any part of the spring, the bridle, or the netting.

Center the base of the pilot chute spring over the grommet in the No. 1 flap while folding the bridle away from the grommet. Make sure that none of the bridle is near the closing loop.

Compress the pilot chute spring. Due to the strength of the pilot chute spring, it is best to collapse the spring coils by starting at the bottom and pushing a single coil down, alternating left or right, until all are completely collapsed. DO NOT wrap any part of the pilot chute canopy or mesh around the spring!

HELPFUL HINT

A packing paddle or leverage tool attached to the pull-up cord is required for the next step.

While pushing down on the pilot chute to keep it compressed, remove the temporary packing pin from the No. 1 flap, pull the closing loop through the grommet in the top of the pilot chute, and reinsert the temporary packing pin in the closing loop above the pilot chute. Note that the top of the reserve pilot chute is numbered 2.

If the closing loop is the correct length, the coils of the pilot chute spring should not wobble excessively when the pilot chute is compressed.

Gently pull on the pilot chute canopy to spread it and the mesh to their full diameter.

IMPORTANT!

Make sure that all canopy fabric and mesh are withdrawn from within the coils of the pilot chute spring.

Place your knee or foot on the center of the pilot chute top and apply pressure while pulling up on the No. 4 and No. 5 reserve container side flaps. Work the pilot chute into the packed bag, and work the canopy into the corners of the container. Filling the corners completely is very important for bulk distribution and proper pilot chute seating.

Accordion fold the pilot chute canopy under from the top and under from the bottom until the parallel edges of both folds are approximately 1-1/2” to 2” from the edge of the pilot chute top. DO NOT place any portion of the folded canopy and mesh under the spring.

Thread the pull-up cord through the hole in the AAD cutter assembly (if installed), then through the grommet on the No. 3 flap.

IMPORTANT!

Double check to make sure the pull-up cord passes through the hole in the AAD cutter assembly (if installed).

Wrap the ends of the folded pilot chute around the pilot chute top and place them under the No. 3 flap with the ends facing the bottom of the container. Again, make sure that none of the canopy or mesh is placed under the pilot chute spring.

CAUTION!

If an AAD is installed, avoid using excessive force on top of the reserve pilot chute when closing the No. 3, 4, 5, and 6 flaps. Do not use a closing plate smaller than the diameter of the pilot chute cap on top of these flaps. Damage to the AAD cutter could result!

Using a packing paddle or leverage tool attached to the pull-up cord, draw the grommet in the No. 3 flap to the grommet in the pilot chute by pulling toward the top of the reserve container. Don't remove the temporary packing pin until the two grommets are touching. Pull the closing loop through the grommet in the No. 3 flap and reinsert the temporary packing pin in the closing loop above the No. 3 flap.

Once the No. 3 flap is pinned, check the coils of the pilot chute to make sure that they are aligned and centered under the No. 3 flap grommet.

Thread the pull-up cord through the grommets in both the No. 4 and No. 5 flaps. Using a packing paddle or leverage tool attached to the pull-up cord, draw both grommets toward the center. Do not remove the temporary packing pin above the No. 3 flap.

While drawing the No. 4 and No. 5 flaps together, firmly slap the side walls of the reserve container to expel air and nudge the flaps closer together.

IMPORTANT!

Do not force either of the side flaps to the center. Work gradually to prevent damage to the reserve container.

Drawing both flaps to the center at the same time will help keep the reserve container symmetrical.

Once the flaps have been drawn to the center over the closing loop, withdraw the pull-up cord from the No. 5 flap, while keeping tension on the pull-up cord through the No. 4 flap.

Remove the temporary packing pin from the No. 3 flap.

Using a packing paddle or leverage tool attached to the pull-up cord, draw the closing loop through the No. 4 flap grommet and reinsert the temporary packing pin in the closing loop above the No. 4 grommet.

Thread the pull-up cord through the grommet in the No. 5 flap. Using a packing paddle or leverage tool attached to the pull-up cord, draw the closing loop through the No. 5 flap grommet and reinsert the temporary packing pin in the closing loop above the flap.

NOTE

At this point it should require maximum effort to draw no more that ¼" of the closing loop beyond the No. 5 flap.

If installed, make sure that the reserve ripcord passes through the first RSL guide ring on the No. 6 flap, then through the RSL ring, then through the second guide ring.

Insert the No. 6 flap and ripcord pin through the retaining loop on the reserve pin cover flap.

Thread the pull-up cord through the grommet in the No. 6 flap.

Using a packing paddle or leverage tool attached to the pull-up cord, draw the closing loop through the No. 6 flap grommet and insert the ripcord pin in the closing loop above the flap.

IMPORTANT!

Measure the force required to move the ripcord pin to verify that it takes less than the required maximum of 22 lbs.

Inspect and account for all tools used.

Seal the ripcord pin with 5 lb. seal thread in accordance with The Parachute Manual and complete the packing data card.

Close the reserve pin cover.

15 TRAP SYSTEM™ (MARD) Packing Instructions
G3, G4 and RTS

The Mirage TRAP SYSTEM™ is a unique approach to how a Main Assisted Reserve Deployment (MARD) system functions. The Trap System design is simple, reliable, and rigger friendly.

The TRAP SYSTEM™ is not attached to the reserve bridle in any way until needed. Only when the main parachute is cutaway does the Trap engage and aid in deployment of the reserve parachute. If the ripcord is pulled, or an AAD deploys the reserve, there is no mechanical device that must first detach to allow your reserve to deploy normally.

The TRAP SYSTEM™ includes these parts:

1. The Trap and the Trap Door (cover), which are sewn to the No. 1 pilot chute kicker flap of the Mirage reserve container;
2. A red RSL lanyard with a Trap Line installed;
3. A modified reserve bridle which is simply folded and sewn for insertion into the elastic keeper;
4. A pair of Mirage Systems, Inc. main risers with a factory installed RSL ring.

Caution!

Use ONLY main risers made by Mirage Systems, Inc., with a factory installed RSL ring! The TRAP SYSTEM™ has not been tested using risers built by other manufacturers.

Use ONLY genuine TRAP SYSTEM™ parts available from Mirage Systems, Inc. The use of locally modified reserve freebag bridles or locally made replacement RSL lanyards and Trap Lines is not authorized!

The following instructions should be followed closely to properly assemble and pack the TRAP SYSTEM™.

Assembly

1. Fold the RSL together, mating the velcro strips, and insert under yoke with snap shackle tab facing inward.

2. Route the RSL over the yoke toward the reserve container and place under the lip of the RSL retainer (a half-twist outward is helpful).

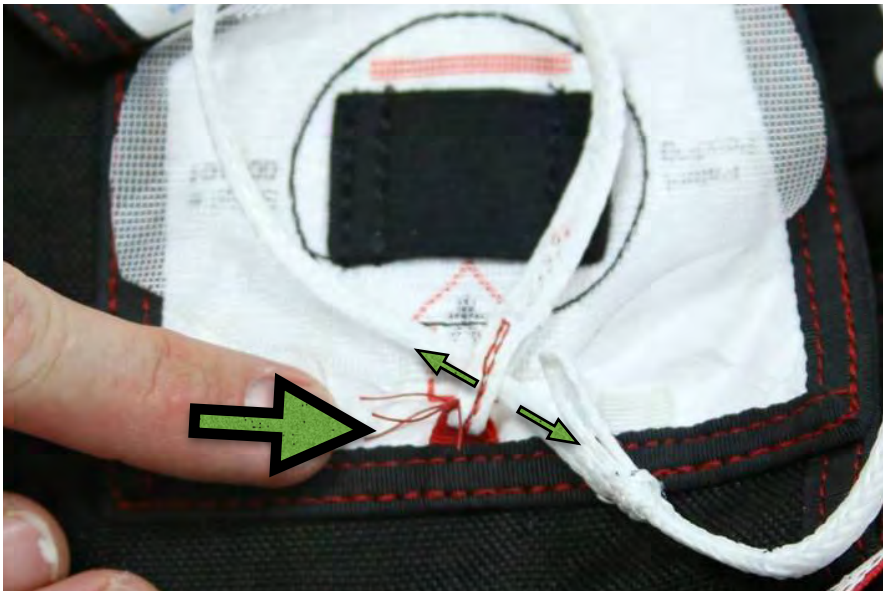
3. Fold the retainer and RSL onto the yoke, removing any twist in the RSL. The label on the RSL should now be facing up.

4.Pull the Trap Line through the loop on the end, forming a cinch. The end loop has red stitching.

<u>Helpful Hint</u>
A clamp can be used to keep the Trap Door folded out of the way during the next steps.

5. Place the Trap Line on top of the mesh as illustrated on the inside of the Trap Door.

6. Thread a doubled length of cotton 24/4 safety tie thread through the end loop on the Trap Line, and the red tab on the Trap. Do not use a needle to pierce the end loop or Trap Line.



7.Tie the end loop and red tab together with a surgeon's knot and a square knot. Cut thread leaving ¼"– ½" (.635cm - 1.27cm) tails. **Make sure that Trap Line is free to slide through the loop after the knot is tied!**

8.Tie the white loop on the Trap Line and the white tab on the Trap together using doubled cotton 24/4 thread. Cut thread leaving ¼" – ½" (.635cm - 1.27cm) tails.

9. **IMPORTANT! Place the Trap Line UNDER the mesh, as shown. The loop should be evenly distributed.** Smooth the mesh.

10. With the loop for Trap Line on the RSL facing up, route the ripcord cable through first guide ring on No. 6 reserve pin flap, the ring on the RSL, then the second guide ring on the the No. 6 reserve pin flap, as shown. Make sure that the RSL and Trap Line are not twisted.

11. Neatly tuck excess RSL and Trap Line between the reserve container and the back pad, as shown. Remove the clamp, if used.

Packing

12. Fold the reserve canopy in accordance with the canopy manufacturer's instructions and place in the reserve bag in the normal manner.
13. Place the packed reserve bag into the reserve container.

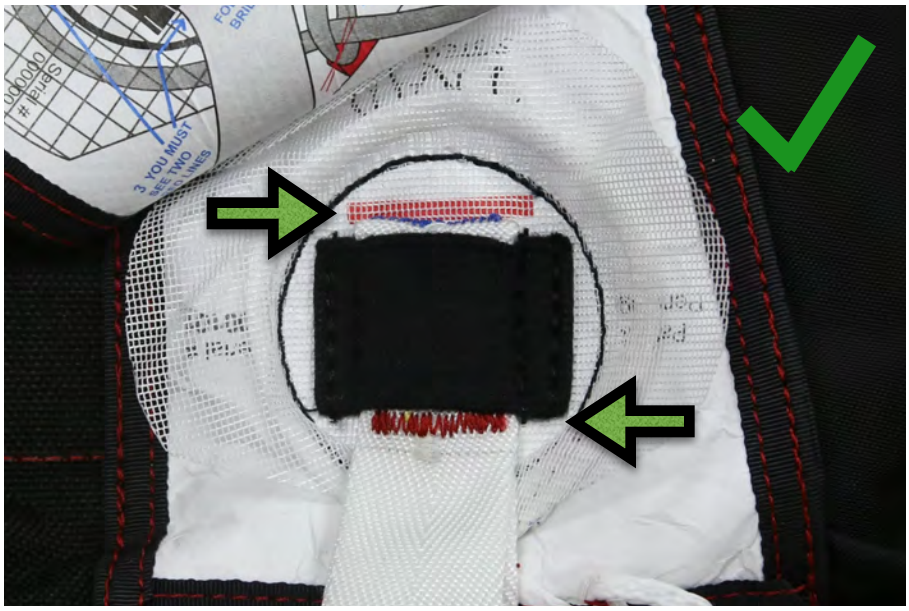
14. Starting on rigger's left, make two stows of the reserve bridle, then make 1-1/2 stows on the right, forming a "V", on top of the packed bag.

15. Close the No. 1 kicker flap over the stowed bridle with the bridle exiting at the rigger's upper right and pin in place.

16. Fold the bridle over the No. 1 kicker flap toward the top of the reserve container, removing any twists. Fold the bridle together on the **BLUE** line. The **RED** line should now be facing DOWN toward the kicker flap.

17. Rotate the folded end of bridle under toward the bottom of the reserve container. The **RED** line is now facing UP and the remainder of the bridle running to the reserve pilot chute should be DOWN. There should be no twists in the bridle.

18. **Caution! Insert the folded bridle under the elastic keeper in the DIRECTION OF THE RED ARROW printed on the Trap label!**



19. The bridle should only extend beyond the elastic enough to slightly see the blue line. **When properly stowed TWO RED LINES MUST BE VISIBLE!**

<u>Helpful Hint</u>
The folded bridle may be pushed through the elastic loop and then pulled back until the blue line is even with the edge of the elastic.

Caution! DO NOT pack the TRAP SYSTEM™ with the bridle EXTENDED beyond the RED line printed under the mesh.

20. **C**lose the Trap Door.

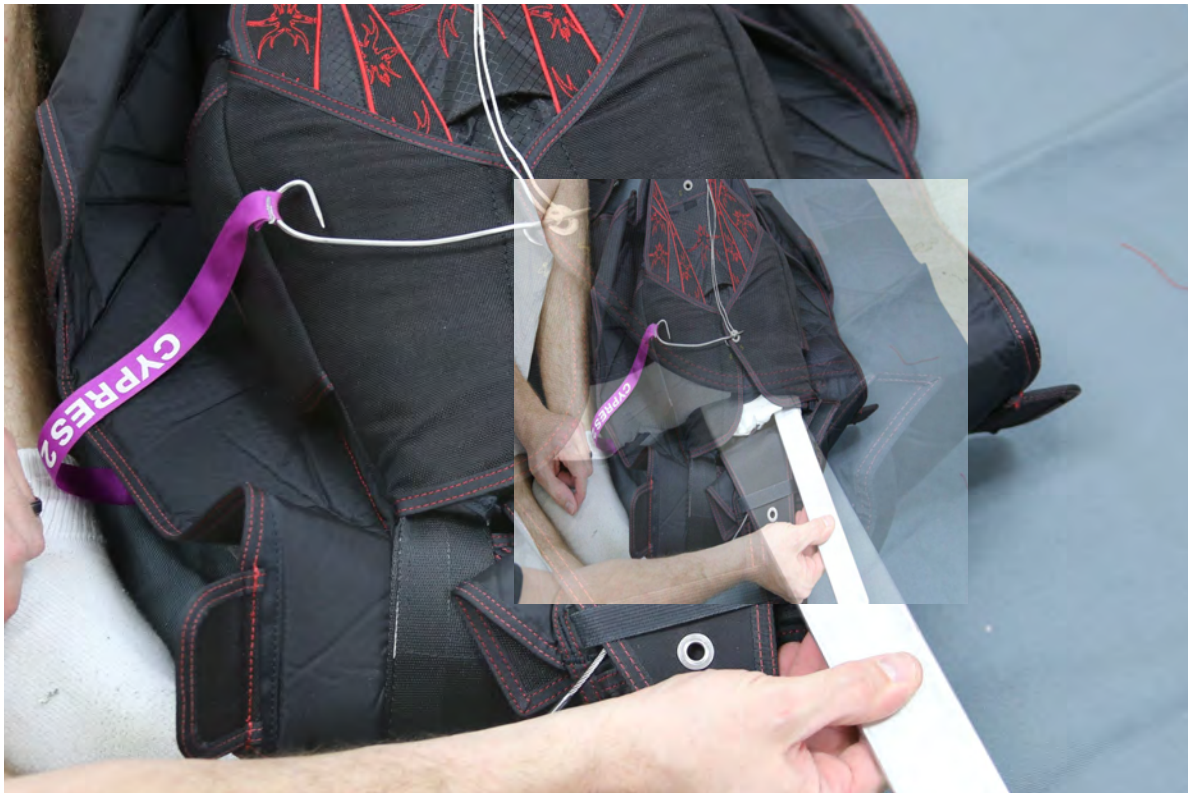
21. Place the bridle loosely on top of the Trap Door, using caution not to pull the bridle out of the elastic keeper. Tuck excess bridle under the edge of the No. 1 kicker flap.

22. Make a short “W” fold placing the remainder of the bridle on the opposite side of grommet. Do not twist.

23. Stow the remainder of the bridle on the rigger's left.

24. Compress the pilot chute and close the reserve container 3, 4, and 5 flaps.

25. On the G4.1, place the No.6 ripcord pin flap and ripcord through the retainer on the ripcord pin cover flap BEFORE pulling the closing loop through the No. 6 flap.



CAUTION!
Do not use a packing paddle near the Trap.

26. Insert the reserve container tuck tabs between the reserve risers and the reserve freebag. Make sure that the Trap Line and/or RSL are not disturbed when inserting the tuck tab. The Trap Line and RSL must be inboard of the tuck tab.

27. Close the No. 6 flap and insert the ripcord pin.

28. When packed, very little (if any) of the Trap System should be visible.

29. When re-packing the reserve, the Trap should be visually inspected. Unless it has been used, there is no need to remove and reinstall the Trap Line.

If you have any further questions or concerns regarding proper care and packing of the Trap System, please contact Mirage Systems, Inc at 386-740-9222.

16 – INSTALLING THE MAIN PARACHUTE CANOPY AND RISERS

It is recommended that the main parachute be installed by an appropriately rated Senior or Master parachute rigger.

Attach the main parachute risers to the harness release rings after the reserve parachute is assembled and packed. If an RSL is installed on the reserve parachute, the main riser with the RSL connecting ring is installed on the wearer's left.

NOTE

Main risers manufactured by Mirage Systems, Inc. have the RSL connecting ring mounted BELOW the 3-ring release grommet passing through the riser. Main risers are considered a "weak link" between the forces your main canopy can generate and your harness. Experience has proven that main risers can break at the riser grommet if subjected to a high G-load.

If the RSL connecting ring is installed above the riser grommet and that riser was to break, the reserve parachute could be deployed while the malfunctioning main parachute is still attached by the opposite riser. For this reason, main risers made by another manufacturer may not be compatible with your Mirage RSL.

Only install main risers with the RSL connecting ring mounted below the 3-ring release grommet passing through the riser. If the risers were not manufactured by Mirage Systems, Inc., check to make sure that the RSL is long enough to reach the connecting ring. Mirage risers are mandatory when the Trap system is installed.

Thread the yellow release cables of the breakaway system through their respective housings and mate the hook velcro on the handle with the pile velcro located in the pocket. The handle should be positioned close to the cable housings so that very little yellow cable is showing between the handle and the ends of the housings.

CAUTION!

If an RSL is installed, verify that the exposed yellow release cable extending from the short housing end fitting is 5.75" long, and exposed yellow release cable extending from the long housing end fitting is 6.25" long.

When the release cables are withdrawn, the right riser MUST release BEFORE the left side riser with the RSL attached.

If an RSL is not installed, the length of the yellow release cable extending from the end fittings can be 6" (both sides).

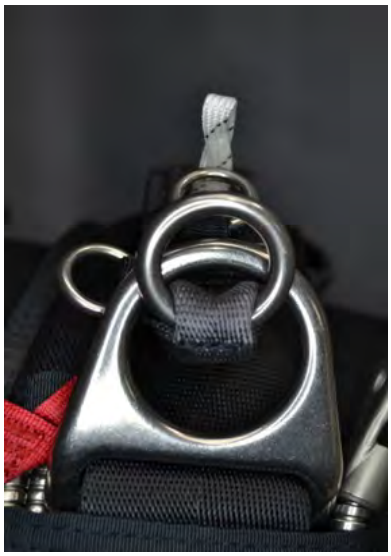
The minimum length for any release cable is 5.5", and the maximum is 6.25".

NOTE

Each main riser has two rings. The larger ring on the end of the riser is referred to as the "middle ring" when the 3-ring release mechanism is assembled.

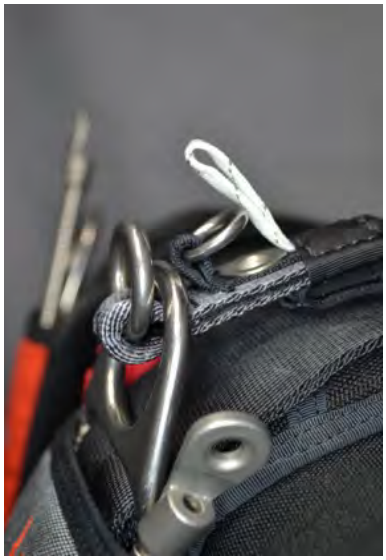
WARNING!

Main risers designed to be installed with the middle and small release rings to the rear of the risers could fail in an emergency situation and are not recommended!

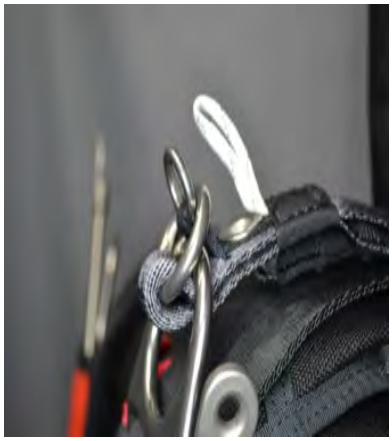


Begin with either riser. Assembly is easier if the harness is positioned face up on a table or bench.

With the rings on the riser facing the front of the harness, pass the larger middle ring on the end of the riser through the release ring on the harness from the rear. Fold the ring forward and up toward the small ring on the riser.

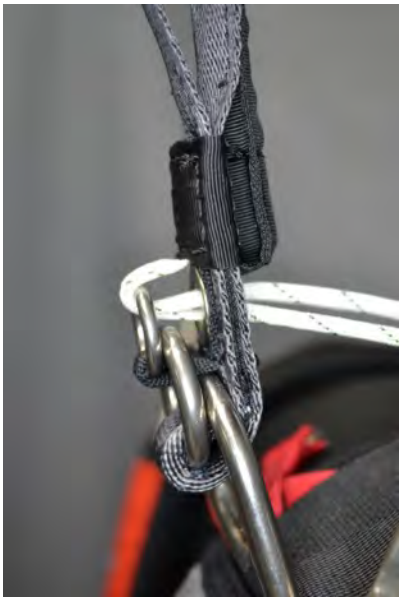


Pass the small ring through the middle ring from the rear and fold the small ring forward and up toward the grommet in the riser.

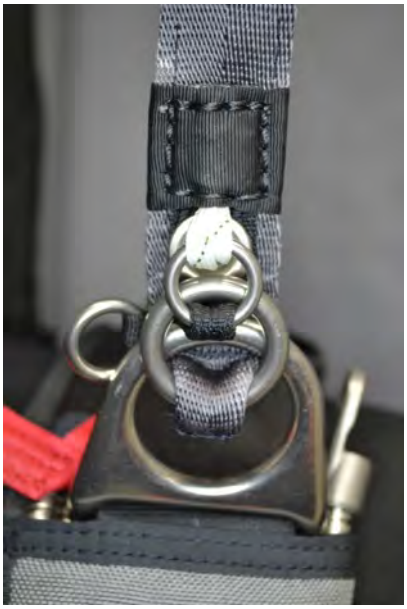


CAUTION!

Make sure that the small ring only passes through the middle ring!

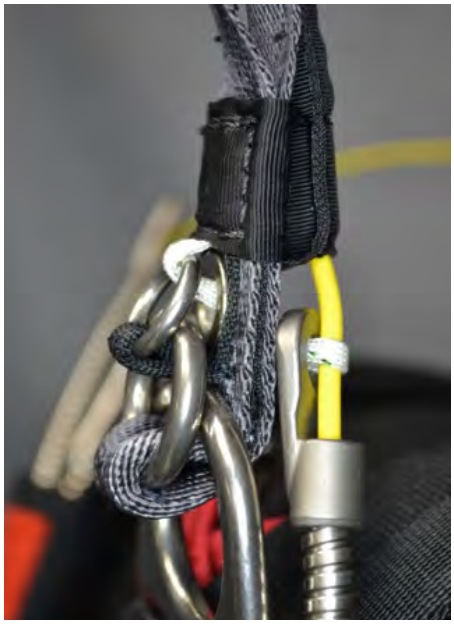


Thread the Type IIA loop over and through the small ring, then continue down through the riser grommet, exiting the grommet at the rear of the riser.



CAUTION!

Make sure that the Type IIA loop only passes through the small ring before entering the grommet!



Making sure that there are no twists in the Type IIA loop, thread it through the end fitting on the release housing. Pass the Type IIA loop through the end fitting from the long, flat side, and exiting on the cable housing side of the fitting. The flat side of the end fitting must face the back of the riser.

Insert the yellow release cable through the Type IIA loop, making sure the loop isn't twisted. Be careful not to bend or kink the yellow cable when inserting it through the loop.

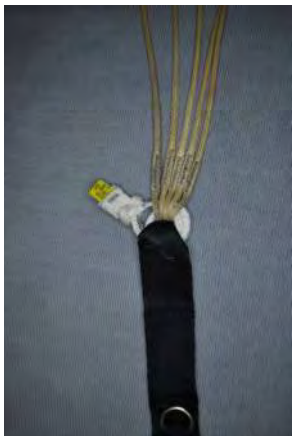
Insert the free end of the release cable into the protective housing installed on the rear of the riser, making sure that there are no kinks or loops in the cable between the loop and the housing.

NOTE

If using main risers not manufactured by Mirage Systems, Inc., it is recommended that the risers have flexible, metal protective housings for the yellow release cable ends.

Repeat the assembly process for the opposite riser.

Inspect both assembled 3-ring release mechanisms and, if used, attach the RSL quick release shackle to the connecting ring on the main riser.
Lay the Mirage out face down with the risers extended fully. The rear risers will be facing up. Make sure that there are no twists in the risers.

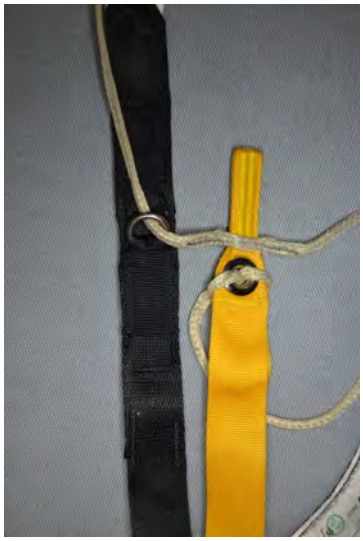


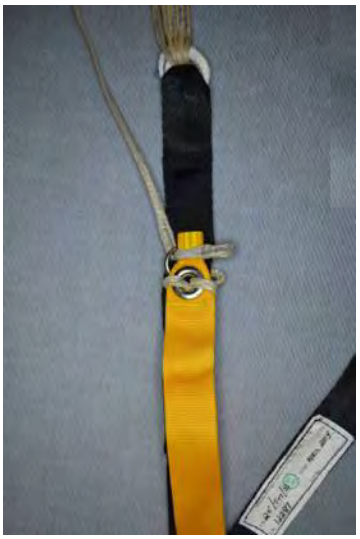
Attach the main parachute canopy to the risers, making sure that the four line groups are routed to their correct riser. Perform a thorough suspension line continuity check after installation.

Follow the main canopy manufacturer's recommendations in using either Rapide Links or Slinks to attach the main canopy suspension lines to the risers.

When installing Rapide Links, the installation of vinyl tubing or fabric slider stops is recommended to prevent damage to the slider grommets. Use a type recommended by the main canopy manufacturer.

Route the left and right main canopy steering lines through their corresponding guide rings on the rear main risers and attach the toggles to the steering lines in a manner recommended by the main canopy manufacturer. Toggles are attached at the point marked on the steering lines by the canopy manufacturer. Perform a continuity check after installation.





17 - INSTALLING THE MAIN DEPLOYMENT BAG AND PILOT CHUTE

NON-COLLAPSIBLE MAIN PILOT CHUTE

The bridle of a standard non-collapsible main pilot chute is 7' in length and has a loop at each end. A curved pin, a velcro tab, and bag stop are sewn a short distance from the bag end of the bridle.

Insert the pilot chute end of the bridle through the two pilot chute bridles. Hold the pilot chute end loop open and pass the entire bridle through it. Cinch the resulting larks head knot tight on the canopy bridle loops.

Thread the bag end bridle loop through the grommet in the top of the deployment bag, from the outside in.

Pass the bag end bridle loop through the canopy bridle attachment loop. Hold the bag end bridle loop open and pass the deployment bag, bridle, and pilot chute through it. Cinch the resulting larks head knot tight on the canopy bridle loop

COLLAPSIBLE MAIN PILOT CHUTE

The bridle of a standard collapsible main pilot chute is 7' in length with the pilot chute permanently attached to the bridle. Lengths of 9' and 12' are available options. A curved pin, velcro tab, kill line window, and bag stop are sewn a short distance from the bag end of the bridle. A kill line runs the length of the doubled bridle webbing, exiting between the two loops of the bag stop. The exposed end of the kill line is sewn into the stitching forming the canopy end loop.

Thread the bag end bridle loop, exposed kill line, bridle retaining line and loop, and the two bag retaining loops through the grommet in the top of the deployment bag, from the outside in.

Thread both bag retaining loops onto the Rapide link with the exposed kill line and bridle retaining line and loop running through the center of the Rapide link. Tighten Rapide link securely with the two bag retaining loops on opposite sides of the link. Center the threaded barrel of the Rapide link inside one bag retaining loop. Note - A Softlink may be substituted for the Rapide link.

Hold the bag end bridle loop open and pass the deployment bag, bridle, and pilot chute through it. Cinch the resulting larks head knot tight on the canopy bridle loop. Make sure the exposed kill line runs directly to the center of the bag retaining loops.

PULL-OUT MAIN PILOT CHUTE

The pull-out main pilot chute is available as a non-collapsible or collapsible version. Both versions use the same removable pull-out handle with lanyard and straight pin.

NON-COLLAPSIBLE

The bridle of a standard non-collapsible pull-out main pilot chute is 7' in length and has a loop at each end. A bag stop is sewn a short distance from the bag end of the bridle. It does not have a velcro tab or curved pin.

Assemble the pilot chute and bridle in the same manner as any standard non-collapsible main pilot chute.

Install the pull-out handle on the pilot chute by passing the small loop on the lanyard through the pilot chute bridle loops, then passing the entire handle, lanyard and pin through the loop, forming a larks head knot. Cinch the knot tight around the pilot chute bridle loops.

Thread the bag end bridle loop through the grommet in the top of the deployment bag, from the outside in and install the bag, pilot chute, and pull-out handle on the main canopy bridle in the same manner as a standard non-collapsible main pilot chute.

COLLAPSIBLE

The bridle of a standard collapsible pull-out main pilot chute is 7’ in length with the pilot chute permanently attached to the bridle. Lengths of 9’ and 12’ are available options. A bag stop is sewn a short distance from the bag end of the bridle. A kill line runs the length of the doubled bridle webbing, exiting between the two loops of the bag stop. The exposed end of the kill line is sewn into the stitching forming the canopy end loop. There is no velcro patch, curved pin, or kill line window.

Install the pull-out handle on the pilot chute by passing the small loop on the lanyard through the pilot chute bridle loops and the small loops on the ends of the pilot chute center lines, then passing the entire handle, lanyard and pin through the loop, forming a larks head knot. Cinch the knot tight around the pilot chute bridle loops.

CAUTION!

Make sure that the kill line is not captured in the larks head knot. The kill line must move freely after the larks head knot is cinched tight.

Thread the bag end bridle loop through the grommet in the top of the deployment bag, from the outside in and attach the bag to the bridle with a Rapide Link in the same manner as a standard collapsible main pilot chute.

Install the bag, pilot chute, and pull-out handle on the main canopy bridle in the same manner as a standard collapsible main pilot chute.

18 - PACKING THE MAIN PARACHUTE

Before attempting to pack your main parachute, complete a course of instruction in parachute packing.

Mirage Systems, Inc. does not recommend one method of folding the main parachute over another. We suggest that you follow the folding instructions provided by the canopy manufacturer, a rigger, or your instructor, until you gain experience in the method you prefer. If you are unclear about any of the procedures described here, ask your instructor or a rigger for assistance.

Inspect the main deployment bag and prepare it for packing by replacing any broken or missing stow bands. Mirage, Inc. does not recommend one type or size of line stow band over another. We suggest that you follow the recommendation made by the canopy manufacturer, a rigger, or your instructor, until you gain experience in the types of stow bands available and what you prefer.

Inspect the main pilot chute. Cock the kill line if using a collapsible main pilot chute.

IMPORTANT!

If using a collapsible main pilot chute, it must be cocked before every jump. Failure to cock the pilot chute could result in a parachute malfunction! When cocked, a blue mark on the kill line will be showing in the window near the curved pin. Consult your instructor or a rigger if you do not understand how to cock the pilot chute and verify that it has been cocked correctly.

OPTIONAL

If using a collapsible main pilot chute, the bridle will have a loop of slack inside the deployment when the pilot chute is cocked. Use care to make sure this loop does not loop around any part of your main parachute canopy, as damage to the canopy fabric may result. Some owners have recommended using a very small rubber band attached to the Rapide® Link to fold and stow the excess bridle webbing.

Set the brakes and stow the excess brake lines in the keepers on your risers. Perform a suspension line continuity check.

Fold the main parachute canopy and place it into the deployment bag.

Be sure to long fold the canopy slightly wider than the deployment bag closing flap. This will ensure that the packed deployment bag completely fills all corners of the main parachute container.

There are three types of main deployment bags available for your Mirage G4.1. These are Standard, Split, and Semi-Stowless. The main difference between all three is how the suspension lines are stowed.

When the parachute canopy is in the deployment bag, close the bag by making the locking stows on the closing flap. Some deployment bags have three locking stows, and some have four, determined by the size of the deployment bag.

The length of each suspension line locking stow (bight) is a matter of personal preference. We recommend a length of 2" to 2-1/2" past the stow band for locking stows. Follow the recommendation made by the canopy manufacturer, a rigger, or your instructor, until you gain experience in the length of stows that work best for your canopy and deployment bag.

STANDARD DEPLOYMENT BAG

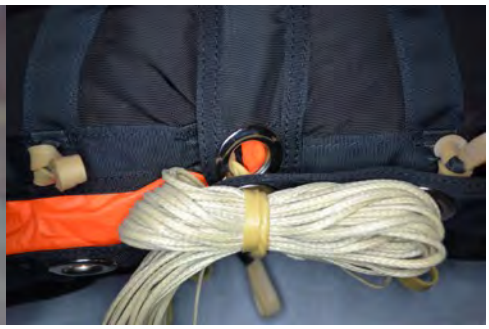
If the bag has three locking stows, make the center locking stow first, then alternate left or right for the two outside locking stows.

If the bag has four locking stows, make the first locking stows in the center, left or right, then alternate left or right to the outside stows.

If you need help, have a rigger or experienced packer show you the proper sequence. Stow the remainder of the lines alternating left or right until 12" to 15" (+/-) of lines remain between the last stow and the risers.

18.1 SPLIT DEPLOYMENT BAG

Some small deployment bags are manufactured as split bags upon request. A split bag has a short notch added in the front of the bag with a cover flap and extra grommet. This allows the mouth of the bag to open larger. The first locking stow is always made at the center notch.

If the deployment bag has three locking stows, pass the center stow band through the extra grommet on the notch cover flap, then through the grommet on the closing flap before making the first locking stow.


If the split bag has four locking stows, make first stow at either center grommet.

Make the remainder of the locking stows alternating left or right across the closing flap. Stow the remainder of the lines in the same manner as a standard deployment bag, leaving 12” to 15” (+/-) between the last stow and the risers.

18.2 SEMI-STOWLESS BAG

A semi-stowless main deployment bag has three or four locking stows and a pouch to hold the remainder of the suspension lines, instead of additional line stow bands.

1. Fold the main parachute in accordance with the canopy manufacturer's instructions and place in the deployment bag. Long fold the main parachute slightly wider than the closing flap of the bag.

2. Close the semi-stowless bag as you would any conventional bag by making the locking stows. Start in the center, then alternate left or right to the outside stows.

3. Roll packed bag toward main pilot chute, placing the line stow pocket facing up. Begin stowing suspension lines by making a large loop on top of one end pocket.

4. Form a "figure eight" pattern with the suspension lines on top of both end pockets. Make sure that suspension line loops are completely across bag.

5. Continue stowing the suspension lines in a figure eight pattern until the main risers are 15" (+/-) from the packed bag.

6. Lift the end pockets and place over the suspension line loops.

7. Close cover.

8. Insert tuck tabs into pockets. The suspension lines must enter and exit the pocket through the notch in cover.

9.Roll packed bag toward the risers and place in main container normally.

19 CLOSING THE MAIN CONTAINER

Lift the packed deployment bag over the reserve container and set it just below the main container. Make sure not to twist or rotate the bag as you do this.

Stow the risers, left and right, alongside the reserve container. Fold the secondary riser covers down over the stowed risers.

Fold the riser covers up over the risers and insert the riser tuck tabs in their pockets on the yoke. Place the ends of the risers to the outer edges of the main container and spread them apart to reduce bulk in the center of the container.

Fold back the main container flaps and place the packed deployment bag into the pack tray, with the suspension lines down and the bridle up.

Lift up on the top flap and rotate the top of the bag toward the reserve container, while pushing it downward into the bottom of the main container.

Make sure the bag fills the bottom corners of the main container. Roll and push the top of the bag down against the bottom of the packed reserve container. With the bulk evenly distributed, the packed main container will have a smooth appearance.

Route the bridle on top of the bag and out the right side of the main container.

Inspect the main closing loop on the No. 1 flap and thread a pull-up cord through it.

Thread the pull-up cord through the grommet in the No. 2 flap and close the flap by pulling the pull-up cord toward the bottom of the main container until the closing loop is completely through the grommet. Pushing up on the No. 1 flap while pulling downward on the pull-up cord can help. Make sure the bridle is routed out from under the right side of the No. 2 flap.

HELPFUL HINT

Kneel on top of the No. 2 grommet and pull-up cord in the middle of the bag with one knee while preparing for the next step. This will prevent the closing loop from withdrawing, keep air from expanding the bag, and help fill the corners of the main container.

Mate the 1" pile velcro on the bridle with the 1" hook velcro sewn to the No. 2 flap. Again, route the bridle to the right.

Close the No. 3 flap by threading the pull-up cord through the grommet on the No. 3 flap and pulling to the right. When you are ready to start pulling, lift your knee from the No. 2 flap, and when the closing loop is completely through the grommet, return your knee on top of the No. 3 grommet and closing loop. Make sure that you don't allow the packed bag to be pushed out the right side of the main container as you close the No. 3 flap.

Close the No. 4 flap by threading the pull-up cord through the grommet on the No. 4 flap and pulling to the left. Make sure the bridle is routed upward from the velcro and away from the No. 4 flap. When you are ready to start pulling, lift your knee from the No. 3 flap, and when the closing loop is completely through the grommet, insert the curved pin on the bridle through the closing loop.

Close the main pin cover.

IMPORTANT!

If using a collapsible main pilot chute, make sure the pilot chute is cocked by verifying that the blue mark on the kill line is showing in the bridle window near the curved pin.

Do not exit the bridle out from under the left side of the No. 2 flap and back across the No. 2 flap left to right. This can result in a slow opening or a pilot chute-in-tow malfunction. A label is sewn inside the main pin cover flap showing a diagram of the standard bridle routing.

With the standard bridle routing, curved pin direction, inserted up or down, is a matter of personal preference. **Always get a pin check before each jump when boarding the aircraft.**

NOTE

An alternate bridle routing sequence has been tested and may be used if desired. Consult with your instructor or a rigger before attempting.

Route the bridle directly from the top of the bag down to the lower right. Do not mate the 1" velcro on the bridle with the 1" hook velcro on the No. 2 flap.

Pull the closing loop through the No. 2 flap.

Close the number 3 flap.

Close the No. 4 flap over the bridle with the bridle exiting the main container from under the No. 4 flap on the bottom right. Verify that a collapsible pilot chute is cocked, then fold the bridle webbing in half away from the curved pin and pin the closing loop.

Push the excess bridle back under the No. 4 flap, making sure that there is plenty of slack between the top of the deployment bag and the curved pin to allow the pin to be extracted by the pilot chute. The end of the curved pin will be facing the top of the main container.

Tuck the remaining bridle under the bottom edge of the closed No. 4 flap, working your way from the center to the bottom corner of the main container, in preparation for folding the main pilot chute.

Route the bridle to the lower left and reverse flaps 3 and 4 if using a left side BOC.

Close the main pin cover. No bridle should be exposed.

19.1 FOLDING THE MAIN PILOT CHUTE

There are several methods of folding the main pilot chute. Mirage Systems, Inc. does not recommend one method over another. We suggest that you follow the folding instructions recommended by your instructor or a rigger, until you gain experience in the method you prefer. If you are unclear about any of the procedures described here, ask your instructor or a rigger for assistance.

Spread the pilot chute canopy out with the mesh up. Fold the canopy in half at the handle, with the fold parallel to the longest portion of the handle. The bridle should exit the bottom between the folds.

Make a second fold parallel to the first by folding the edges up toward the handle, making the folded pilot chute approximately the length of the spandex pouch.

S-fold the bridle on top of the canopy folds just under the handle until about 8” of the bridle remains unfolded from the canopy to the bottom corner of the main container.

Fold the ends of the folded canopy to the center, until the folded pilot chute is approximately 4” wide.

Insert the folded pilot chute into the spandex pouch. No bridle or main pilot chute material should be exposed when the pilot chute is properly stowed. Any exposed bridle or pilot chute could result in a premature deployment.

If the pilot chute is equipped with a freefly tab, insert the tab under the edge of the right main container flap.

20 PULL OUT PILOT CHUTE PACKIN**G**INSTRUCTIONS

1. A strip of binding tape is installed on the top of collapsible pull-out main pilot chutes to aid in cocking the pilot chute.

CAUTION!

Collapsible pull-out main pilot chute bridles do not have a window to verify that the kill line is cocked. Get advice from an instructor or a rigger if you are

2. After placing the main canopy in the container. Remove all twists in the bridle, and check that the pilot is cocked.

3. Prior to closing flaps 1 and 2, insert the handle freefly tab under the edge of the main container flap, as shown.

4. Neatly fold the bridle and place on center of the main deployment bag.

5. Place bridle under pilot chute. Place pilot chute bridle attachment at the bottom right side of container (for right-handed user). Make sure grommet tab is extending out of container on top of bottom flap. Pin lanyard must move freely through grommet.

6. Fold the pilot chute canopy back over mesh and close flaps 1 and 2.

Important: Make sure the pin lanyard runs directly from the straight pin to handle through the tab grommet. Tab must remain in bottom corner of container, as shown.

7. Close flaps 3 and 4.

Important: Make sure the grommet tab remains in bottom right corner and is free to pop down easily as shown.

8. Tuck lanyard and tab under the side flap and close pin cover.

Note: Get instruction if you have never packed or used a pull-out pilot chute. Practice deploying the main parachute on the ground.

21 - MAINTAINING YOUR MIRAGE

Your Mirage will function correctly, look better, and last longer if maintained properly. Like any piece of sporting equipment that is subject to wear and tear, it will last longer with routine maintenance.

INSPECT YOUR MIRAGE REGULARLY

It is a good idea to inspect it before each use. It only takes a few minutes to inspect it for any obvious signs of damage, contamination or unusual wear. Check the entire outside, front and rear.

Each time the main parachute is repacked, the canopy, suspension lines, deployment bag, pilot chute, bridle, risers and toggles should be inspected by the packer.

Once a month, examine the rig closely, making note of every detail. Small problems can turn into costly repairs if not corrected early. Delaying repairs could result in further damage, or even a malfunction.

Report any minor problems to your rigger before they become major. Never attempt to repair any problems yourself, unless you are a certified rigger.

Your rigger is responsible for determining the airworthiness of the entire approved assembly when he/she repacks the reserve parachute. The approved assembly part of your Mirage is everything except the main parachute and its components. This is an important part of maintaining the safety and reliability of your Mirage, and is accomplished every 180 days in the U.S.

If you have any concerns about your main parachute, talk to your rigger. He/she can answer your questions and probably perform any required maintenance.

PAY ATTENTION TO THESE ITEMS WHEN INSPECTING YOUR MIRAGE:

Breakaway System – Inspect the 3-Ring release mechanism, which includes the harness rings and main risers, the release handle with cables, and the release housings. Check for proper assembly, damage or wear. Pay particular attention to the Type IIA fabric loops on the main risers and the condition of the yellow release cables. Refer to the 3-Ring Release Maintenance instructions at the end of this section for detailed inspection requirements.

Reserve System – You obviously can't inspect what is inside your reserve container, unless you are a certified rigger. However, there are several critical checks on the outside of your reserve that you should get in the habit of making.

Check the reserve ripcord handle and exposed cable for any sign of damage. Check to make sure the ripcord pin is properly seated and not bent. Make sure the ripcord pin and grommet are free of soil or debris. Make sure the ripcord pin protector flap is secure.

If installed, check the RSL and quick-disconnect snap shackle, and check the stitching securing the RSL guide rings for broken stitching. Make sure the ripcord cable passes through the first guide ring, the RSL ring, then the second guide ring.

Check the reserve closing loop for fraying or wear. Caution! Report a frayed closing loop immediately to your rigger! Never jump your Mirage if the reserve closing loop is frayed. A frayed closing could break which would immediately deploy your reserve parachute!

Check the packing data card to determine if the reserve repack is in date, and check to make sure the rigger's seal is in place and not broken.

Harness – Check the harness for signs of contamination, abrasion, cut or frayed webbing, and broken stitches. Check the metal hardware for abrasion or corrosion.

Main Container – Check for damage, wear, or broken stitches. Check plastic stiffeners and replace any that are broken. Check the velcro tab that retains the bridle for broken stitches. Check grommets, and have any replaced that may be damaged or pulling out of their setting. Check the condition of the spandex pilot chute pouch and replace if torn or worn out. A loose pouch could lead to a premature deployment of the main parachute. Check the main closing loop and replace if frayed.

Main Pilot Chute – Check for any signs of torn fabric or broken stitches. Check the bartacks that secure the handle to the canopy for broken stitches. Check the bartacks securing the centerline to the canopy and the bridle. If collapsible, check the condition of the kill line. Inspect the bridle for damage, frayed webbing, or broken stitches. Check the curved pin for damage, or corrosion and security of attachment to the bridle. Replace if bent. Do not attempt to straighten a bent pin. Repair or replace pilot chute if mesh is torn. Some separation of the weave of the mesh is normal with use.

Automatic Activation Device (Optional) - Inspect according to the AAD manufacturer's instructions.

WHAT TO AVOID

Most of the fabric used to manufacture your Mirage is nylon. While nylon is a very durable material that is easy to care for, it can be damaged like anything else. You need to be aware of what will harm your Mirage. Repairs can be very expensive.

Sunlight – The ultraviolet rays in sunlight can quickly fade and permanently weaken nylon. Keep your Mirage out of direct sunlight when not in use. Remember that ultraviolet radiation from incandescent lighting can cause damage also.

Heat - Excessive heat can damage nylon. Avoid storing your Mirage near any heat sources such as lamps, radiant heaters, or running machinery.

Acids – Nylon, like most other fabrics, is easily damaged by a variety of acids. Keep your Mirage away from hangar floors and dirty car trunks, or similar places where acids may be present. Acid can quickly damage many layers of nylon if left unnoticed. If contamination occurs, try to isolate the damaged area from the rest of your Mirage and immediately neutralize the acid with baking soda and water if readily available. If not, thoroughly rinse with warm, soapy water or plain water. If acid contamination is suspected, a rigger must thoroughly inspect your Mirage to look for hidden damage.

When not in use, it is always a good idea to keep your Mirage in a rugged canvas bag or plastic bin. While a heavy nylon or canvas bag is helpful in protecting your Mirage from dust and dirt, it won't prevent acid from destroying your Mirage. A plastic bin in the trunk of your car could save you hundreds of dollars in repair charges.

Oils and Grease – Most petroleum products do not damage nylon. They simply stain it. Your rigger may be able to remove some petroleum stains with dry cleaning fluid. Others, like grease, are very difficult to remove and some stubborn stains may be impossible to remove completely. Your rigger can check with a local professional cleaner for advice.

Water – Water will not structurally damage nylon, but it can cause some fabric and tape colors to run or bleed onto lighter adjacent materials. Some parts of your Mirage may shrink. Moisture promotes mildew, which can permanently stain fabric.

Sea water immersion should be avoided, as it can corrode some components and even rust "stainless steel" hardware if not thoroughly rinsed out by a prolonged soaking in fresh water. If exposed to sea water, notify your rigger immediately. The rig will need to be completely disassembled to make sure that all components can be thoroughly rinsed. The AAD (if installed) will need to be removed and be serviced.

Perspiration can cause damage similar to sea water, but on a smaller scale. If you jump in a hot climate, consider washing your Mirage occasionally.

Soil – Soil, or "dirt", may damage your Mirage. The sand and grit in soil can be abrasive to nylon materials. Brush off soil with a soft brush when dry, and wash soiled area. Check to make sure

that soil is cleaned from the ripcord housing and ripcord pin, reserve container grommets, and 3-ring release rings and housings. Soil inside of webbing around metal hardware can be abrasive. Consult your rigger if heavily soiled.

Sand – Fine sand can weaken and cut webbing and fabric and prolonged exposure to fine sand can shorten the life of the entire assembly. Fine sand on webbing can cause slipping through hardware. It is recommended that your Mirage be washed every 500 jumps to remove sand if used in a desert climate.

Abrasion – Nylon frays quickly when dragged across concrete or other rough surfaces. Always pack your Mirage on a clean, covered surface, such as carpet. Do not drag your Mirage on concrete when packing the main parachute. Always have your rigger examine your Mirage if you slid on a rough surface, or if dragged due to the wind. If you slide to a stop on landing, have your rigger check for damage to your leg straps.

CLEANING

Cleaning your Mirage occasionally may make it look better, but there are some things to keep in mind before you toss your Mirage into the bathtub:

Clean your Mirage only when it needs it. Like a new shirt, it is going to change in some way each time you wash it. Some colors will fade, some colors can run, and some parts may shrink.

All stains cannot be removed. Ground-in dirt, grass stains, or blood are extremely difficult to remove completely. Don't wash your Mirage expecting it to look "like new" when it comes out of the wash.

Your Mirage may last longer if you wash it. If you jump in a hot, dusty location, washing your Mirage will remove abrasive sand or dust and help prevent fraying of the webbing around the hardware. Washing will also remove salt residue from perspiration that can cause corrosion or rusting of the hardware.

A dry cleaning solvent such as MEK or naptha can be used to spot clean small areas of oil or grease. Check a small area for colorfastness before attempting, as some solvents can cause the color to run. Consult with a local professional cleaner before using.

Use a soft brush to remove surface dust and dirt. Washing your Mirage can cause the fabric to fade and some parts to shrink, so wash it only when needed. Wash it gently with a mild detergent like Woolite ®, Ivory Liquid®, or a similar detergent. Wash in cold water and use a soft brush. Do not use bleach or harsh chemical cleaners. Squeeze, but do not wring the fabric to remove excess water. Air dry only, which can take several days.

3-RING RELEASE MAINTENANCE

The 3-ring release is a simple and reliable mechanism that allows a skydiver to quickly jettison a malfunctioning main parachute. In use for several years with excellent results, it is one of the foremost safety advances in skydiving equipment to date. Like all skydiving gear, the 3-ring release should be carefully inspected and tested regularly.

Anytime 3-ring release mechanisms are subjected to abuse, such as abrasion from dragging across a runway, it is important that a complete inspection be performed prior to the next jump.

It is also important to keep the mechanism clean at all times. Mud, dirt, and dust can clog housings, damage components, and adversely affect the reliability. If your Mirage becomes immersed in mud or muddy water, clean the mechanisms with mild soap and warm water, and dry thoroughly before use.

To ensure reliability in an emergency situation, operate the 3-ring release mechanism at least once a month while on the ground and inspect the components thoroughly. Inspect more frequently in humid, muddy, desert or freezing climates.

MONTHLY RELIABILITY CHECKS

If an RSL is installed, begin by disconnecting the quick disconnect snap shackle from the left main riser, then pull the release handle to extract the release cables completely from their housings. Tug on the main risers to unfold the two small release rings and disconnect them from the large release rings on the harness.

Flex the risers - When disconnected from the harness, vigorously twist and flex the webbing of the risers where the two smaller release rings are attached. This will help remove the natural tendency of the webbing to “set”, or deform, from use. Check the grommets that the Type IIA loop passes through for burrs or sharp edges. Check the housings on the back of the risers for damage and security of the stitching.

Check the Type IIA fabric loops – Carefully examine the two loops for wear, abrasion and cleanliness. Check the security of the stitching attaching the Type IIA loops to the main risers. Flex the Type IIA loops to help remove the “set”.

Inspect for wear - Closely inspect all components for any signs of wear or damage.

Note:

It is normal for release rings to develop small dings and dents due to the opening forces generated by the main parachute. As long as no sharp burrs are present, small dings and dents can be ignored.

Check the stitching – Check the security of all stitching holding the small release rings to the main risers, and check the security of stitching holding the release rings to the harness.

Check the cables – Inspect the yellow release cables for kinks, burrs, nicks, or any irregularities, paying particular attention to the last few inches of the cables that pass through the Type IIA loops. Inspect the ends of the cables. The cables are finished at the factory with a smooth, rounded end. Before re-installing, clean and lubricate the cables with a dry, clean cloth and spray silicone. Refer to the "Installing a Replacement Cutaway Handle " in this section for complete installation details.

Check the handle – Inspect the release handle for wear, damage, open seams or broken stitches. Inspect the stitching that secures the hook velcro to the handle. Check to make sure that the plastic insert and stiffening tab are not broken.

Check the pocket – Check the release handle pocket on the harness for the condition of the pile velcro. If it is excessively fuzzed and does not hold the release handle securely in place, have a master rigger change it.

Check the housings – Check cable housings for dents, kinks, and corrosion. Check the high-strength end fittings for burrs or sharp edges. Each should have a dimple securing it to the end of the housing. Check the handle ends of the housings for corrosion or burrs. Check the security of the clamps holding the ends of the housings in place.

INSTALLING A REPLACEMENT CUTAWAY HANDLE

The cutaway handle originally delivered with your Mirage had the cable length trimmed specifically for your rig. The overall length of the cables varies according to the harness and container size.

Mirage Systems, Inc., recommends that a qualified rigger install the replacement cutaway handle for you in accordance with the following instructions:

TOOLS NEEDED:
(1) a ruler
(2) a clean soft cloth
(3) spray silicone lubricant*
(4) sharp wire cutters
(5) matches or cigarette lighter

* A dry lubricant, such as powdered graphite, may be used if desired. Use caution, however, since powdered graphite is messy and the stains can't be removed from your rig.

Clean and lubricate the yellow cables – Before installing the yellow release cables, apply a small amount of spray silicone to a soft cloth and wipe the entire length of both cables. Be sure to remove any excess lubricant by wiping the cables with a clean, soft cloth.

Position end fittings – Before installing the release cables, check to make sure that the end fittings are positioned correctly, and that the housings are “at rest”, without any tension on them. The base of the end fitting on the long housing should be about even (+/-) with the top of the harness release ring.

IMPORTANT!

Make sure that there is no sand or grit on the cables when threading the cables through the release housings.

Install cables - Thread both cleaned and lubricated yellow release cables of the breakaway system through their respective housings and mate the hook velcro on the handle with the pile velcro located in the pocket. The handle should be positioned close to the cable housings so that very little yellow cable is showing between the handle and the ends of the housings.

Mark cables for cutting - Measuring the cables from where they exit the end fittings, we recommend that you mark the cables at:

- For non-RSL equipped rigs, 6” (both sides).
- For RSL equipped rigs, 6.25” for the RSL side, and 5.75” for the NON-RSL side.
- The minimum length for any cable is 5.5”, and the maximum is 6.25”.

Double check your marks - Before cutting, we recommend that the handle be removed from the pocket and the release cables be slowly withdrawn to check your measurements.

When the mark on the non-RSL side cable reaches the bottom edge of the hole in the end fitting, the RSL side cable should extend 1/4" to 1/2" past the end of its end fitting. If not, reposition the handle in the pocket and double-check your measurements.

CAUTION!

If an RSL is installed, the RSL side cable MUST release last! If an RSL is installed, verify that the exposed yellow release cable extending from the short housing is shorter than the exposed yellow cable extending from the long housing. The left riser with the RSL attached MUST release AFTER the right riser releases when the cables are withdrawn.

Cut the cables - When you are satisfied that the cables are marked correctly, cut each cable at your marks with sharp wire cutters.

Finish the ends of the cables - After cutting, finish the ends to cover the exposed inner steel cable.

Using a lighter or matches, warm the yellow plastic coating for 5 seconds to soften it. Hold the end of the cable at the edge of the flame, but not in the flame.

Remove the flame and quickly pull and roll the yellow plastic coating with your fingers over the end of the exposed steel cable. Make sure that no cable remains exposed, and that there are no burrs or snags. Reheat very briefly if needed to shape the ends.

CAUTION!

Heating the cable ends too long can result in injury! Heat only long enough to soften the yellow covering, not melt it or set it on fire!

REPAIRS

Every part used to construct your Mirage could be replaced if required. Some are easy to change, and some require major reconstruction of the rig.

Depending upon what is being repaired and how the repair must be accomplished determines if the repair is considered to be a major or minor repair.

MINOR REPAIRS

The following parts can be ordered as replacements or spares and are easily changed by a Senior or Master Parachute Rigger. Replacing any of these parts with a factory made replacement part is considered a minor repair, and may be accomplished by an appropriately rated Senior or Master Parachute Rigger, or a foreign equivalent.

Main deployment bag
Main pilot chute
Main risers
Main toggles
Main closing loop
RSL lanyard*
3-ring release handle and cables
Leg pad bungee
Leg pads
Reserve ripcord
Reserve pilot chute
Reserve deployment bag
Reserve deployment bag safety stow
Reserve toggles
Reserve closing loop and disc
Lumbar Support strap
Harness webbing keepers

* Replacing the RSL guide rings on the No. 6 flap is considered a major repair.

When ordering any of these parts, the serial number of the Mirage is required to make sure that we send the correct item. Some items also require a length and/or color. Contact Mirage Systems, Inc. for guidance.

MAJOR REPAIRS

Major repairs to your Mirage are authorized if accomplished by an appropriately rated Master Parachute Rigger, or a foreign equivalent. Repairs made to installed parts must return the part to an airworthy condition without altering the design, configuration, materials used, or construction techniques.

The replacement of the following parts is considered a major repair and require the expertise of an appropriately rated Master Parachute Rigger or a foreign equivalent to install. Riggers are encouraged to order replacement parts from Mirage Systems, Inc., rather that trying to make the parts locally. Mirage Systems, Inc. maintains the patterns for all parts made after 1998.

The parts on this list are available from Mirage Systems, Inc.

Any part of the harness webbing
Any part of the harness hardware
Release assembly housings
Reserve ripcord housing
Any part of the reserve container
Any part of the main container
Any part of the back pad and yoke

When ordering parts, you will need to provide the model (G3, G4.1, RTS), size (MZS, M5, etc.), and serial number of the Mirage. Some items also require additional information.

ALTERATIONS

Alterations are changes made to the original design configuration of an approved parachute assembly.

Repairing a Mirage in a manner that does not duplicate the original design, configuration, materials used, and construction techniques, is an alteration.

Alterations to the design of a Mirage are NOT AUTHORIZED, and void the TSO approval.

22- USER INSTRUCTIONS

PUTTING ON YOUR MIRAGE

Putting your Mirage on properly will ensure a proper fit each time you use it. Here is a suggested way to put it on. You will develop your own method, but the key to a proper fit is leaning far forward while tightening the leg straps (step 5, below), and not tightening the chest strap until standing upright.

IMPORTANT! Make sure that you always thread the webbing of the leg straps and the chest strap through the friction adjusters correctly. Get assistance from an instructor or a rigger if you are in doubt.

1. To begin, loosen or undo both leg strap adjusters and undo the chest strap adjuster.

2. If you choose not to undo the leg straps, step through the leg straps and lift the rig behind you. Slip your left arm and shoulder through the left side of the harness yoke and let the rig hang on your left shoulder. Donning the left side first helps to prevent accidentally pulling the reserve ripcord.

3. Slip your right arm and shoulder through the right side of the harness yoke so that the rig is now resting on both shoulders.

4. Thread the chest strap through the adjuster, but do not tighten.

5. This step is important: Bend over forward and slide the rig toward your neck until it touches. While bent over, tighten both leg straps until the leg straps are comfortable. The leg pad ends should be close together. If you try to tighten the leg straps while standing upright, the weight of the rig hanging on the shoulders tends to prevent proper tightening.

6. Stand upright and tighten the chest strap only enough that the harness straps above the chest strap are parallel. Don’t over tighten!

7. Stow excess leg strap and chest strap webbing.

ADJUSTING THE ELASTIC LUMBAR SUPPORT

The Elastic Lumbar Support is standard on all Mirage G4.1s. It consists of elastic webbing, two rings, an adjuster, and a center comfort pad. It's purpose is to aid in keeping the bottom of the main container and the hip rings closer together while "sit-flying", much the same as a bungee cord helps keep the leg pads together.

Use the adjuster located under the center comfort pad to shorten or lengthen the elastic webbing, as required. The webbing should be adjusted so that the elastic webbing will be stretched slightly when the leg strap adjusters are tightened.

NOTE

The Lumbar Support IS NOT A STRUCTURAL PART OF YOUR HARNESS! Do not attempt to use the Elastic Lumbar Support to overcome a problem with the fit of your harness. If you over-tighten it, it will break!

If you have concerns about the fit of your harness, contact Mirage Systems, Inc.

23 SWOOP BELLY BAND INSTALLATION

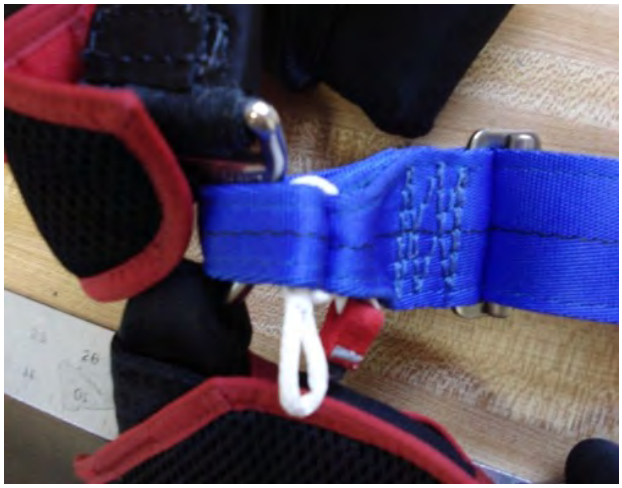
For installation of optional swoop belly band on Mirage harnesses having hip rings.

1. Position adjuster end of belly band at left hip ring with the shorter loop on the inside of harness.

2. Fold long end through hip ring.

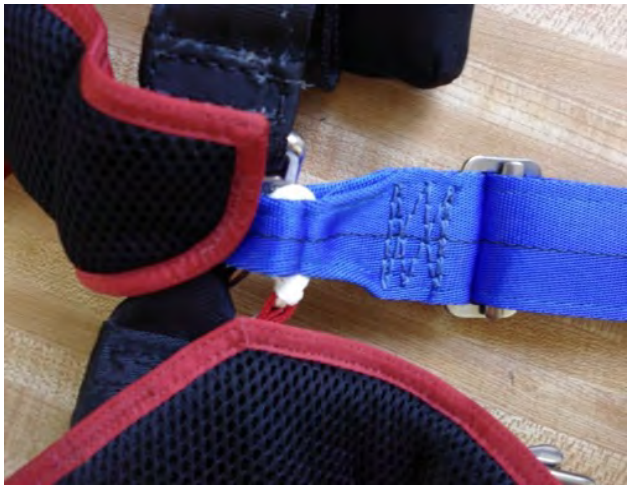
3. With red slink tab facing the leg straps, pass loop end of slink up through one webbing loop, and back down through the other. **Safety note: The slink must pass through both webbing loops twice.**

4. Pass loop end of the slink back through the first webbing loop.



5. Pass the loop end of the slink back down through second webbing loop. Pull slink tight.

6. Pass loop end of slink through opening under red tab.



7. Pass red tab through loop end of slink. Pull tight.

8. Repeat procedure for right hip ring.

9. Properly installed, the adjuster will be on the wearer's left and slinks will be to inside of harness.

24 MAIN RISERS WITH SWOOP LOOPS

Mirage main risers with large swoop loops are designed with Spectra line at the top of the front risers handle. This allows the handle to lay flat when packed into the rig.

1.Make sure that the four line groups are routed to their correct riser.

2. Pass slink through riser and line group a second time. Make sure the slink passes around the Spectra line of the swoop loop.

3.Pass loop end through under tab.

4.Feed tab back through loop and pull tight.

5.Tuck tab away. Perform a thorough suspension line continuity check.

Ram-Air Parachute Owner's Manual

DOC # MAN-011/REV.B

1300 E. International Speedway Blvd.
DeLand, Florida USA 32724
(386) 738-2224
(386) 734-8297

Dear Customer,

We'd like to thank you for your purchase of your new Performance Design canopy. We're confident you'll be pleased with it in every way. You'll like how it opens, flies and lands, and how very durable it is.

We urge you and your rigger to carefully inspect your new canopy to completely familiarize yourself with its features and the quality workmanship. Should you find anything that does not seem right to you or your rigger, please contact us immediately.

Again, thank you for choosing a Performance Designs canopy. With proper care it should last many years and hundreds of jumps.

Sincerely,

Performance Designs, Inc.

Bill Coe

William Coe
President

Table of Contents

Parachute Equipment
Manufacturing, Sales, Service

1300 East International Speedway Boulevard
DeLand, Florida 32724
Telephone: (386) 738-2224
Fax: (386) 734-8297

Your enjoyment of this parachute depends largely on consistently soft openings. That is why Performance Designs concentrates so much on tailoring the aerodynamics of each canopy to give excellent openings.

But aerodynamics alone can't guarantee great openings. In everyday skydiving situations, other factors come into play. Things like line stow tightness, and pilot chute size can greatly affect the openings you experience... in ways that might surprise you!

That's why we urge you to read and understand the attached update to the owners manual. It describes how modern equipment and the latest skydiving trends require the jumper to actively control all factors relating to the deployment sequence. Understanding how these factors relate is essential to your safety and enjoyment.

Thank you for choosing Performance Designs!

Parachute Equipment
Manufacturing, Sales, Service

1300 East International Speedway Blvd.
DeLand, Florida 32724
Telephone: (386) 738-2224
Fax: (386) 734-8297

WARNING

SEVERE HARD OPENINGS MAY CAUSE EQUIPMENT DAMAGE, SERIOUS INJURY OR EVEN DEATH. MINIMIZE THE RISK OF HARD OPENINGS BY READING ALL EQUIPMENT OWNERS MANUALS AND THE SUPPLEMENTAL INFORMATION BELOW.

Solving Deployment Problems

There are many factors that contribute to the opening characteristics of any parachute. When selecting a canopy to jump, you determine some of the basic opening characteristics by choice of canopy design and suspension line type. For example, the actual opening shock loads transmitted to the jumper and equipment is reduced by the amount the lines stretch. Microline stretches less than Dacron line, so higher shock loads will be transmitted with Microline. All canopies have inherent opening characteristics. However, the actual openings you experience are heavily affected by other factors that only you can control. The opening characteristics of some canopies are more heavily influenced by these factors than others. When left uncontrolled, these factors can cause or contribute to extremely hard openings, canopy damage, equipment malfunction, even serious injury or death!

It is possible to "get away with" being sloppy with one of these factors and therefore think it is OK. However, if one or more other factors change it can combine to cause a serious problem.

It Is imperative that you understand the remaining interrelated factors that only you can control. You must make them work for you. Attention to these factors will result in greater consistency in your canopy openings, minimizing the chances of injury or equipment failure. These interrelated factors are:

1. Packing method
    a. canopy folding method
    b. slider position
    c. bagging the canopy
2. Line stow method
3. Pilot chute size, condition, configuration
4. Deployment Airspeed

Make sure your riser covers release properly. Riser covers that release unevenly can cause an out of sequence deployment resulting in equipment damage, bodily injury, or death.

1. PACKING METHODS

a. Canopy folding method
We recommend that you pack your canopy according to the manufacturers instructions supplied with the canopy. Other methods may not work as well. The "briefcase" pack job and the "roll pack" methods are definitely not recommended, since they unfold in a way that promotes asymmetrical inflation, which can cause hard openings, equipment damage, serious injury, or death.

b. Slider position
The exact location of the slider inside the pack job greatly influences the opening speed of the canopy. It is vital that the slider is all the way up the lines; with each and every slider grommet seated against the slider stops that are sewn onto the stabilizers. There should be no twists in the lines above the slider, since they would tend to push the slider down the lines prematurely. This is a common problem with "briefcase" and "roll type" pack jobs.

The orientation of the slider also affects the openings. The center of the slider should be pulled towards the mid point of the center cell. On Sabres, the front half of the slider should be pulled out in front of the center cell A-lines. This is easy to do when packing by the recommended method, and is shown in the owners manual.

c. Bagging the canopy
It is very important to assure the bag is the right size for the canopy and the right size and shape for the container it is being used in.

The correct canopy folding method and slider position must be maintained while putting the canopy in the bag. In short, if it goes into the bag disorganized, it will likely come out disorganized and open hard. If the slider moves even a couple of inches down the lines while bagging the canopy, it can really get your attention on opening. Keeping the pack job intact while putting the canopy into the bag is a skill that must be learned. Read the owners manual and seek assistance for instructions.

You've noticed frequent references to packing as per the owner's manual. If you use another method, you should consider yourself a test jumper.

2. LINE STOW METHOD

Lines should be released one stow at a time. That sounds obvious, but it isn't as simple as it may seem. When the pilot chute first pulls the bag out of the container, it rapidly decelerates the bag. At that instant, the laws of motion say that the lines stowed on the bag will tend to continue with the jumper, rather than decelerate with the bag, unless a force opposes that motion. That force is supplied by the stow bands. If the lines aren't stowed to the bag securely enough, they can all slip out at once. That means the stow bands attached to the bags are literally yanked right off the stowed lines. This is known as "line dump", and can lead to a very dangerous out of sequence opening. If the locking stows fall

off, the canopy is released from the bag and will start to open before it has reached line stretch. It starts filling with air almost instantly while canopy and lines go everywhere! When the jumper traveling at terminal velocity finally reaches line stretch, he already has an open canopy and receives a brutal opening shock. This scenario can damage lines, canopies, risers, and really cause serious injuries. To prevent this from happening, the stow must be held fairly tightly so that they are only released in the proper order. To check your stows on the ground, it should take a minimum of 8 pounds, and ideally 12 pounds of force to unstow the lines pulling the bag across a smooth surface by the bridle. (The emphasis should be toward 12 pounds). Use a fish scale on the bridle to check this. Larger, heavier canopies will require more force, as does a canopy deployed at higher speeds. (This test is important to know how well your stow bands will hold your lines). You can tighten your stows if they are too loose. If you use Tube Stoes, look at the instructions that were included with them. Follow the instructions labeled "For tighter Tube Stoes". Rubber bands can be tightened in the same way. Replace Tube Stoes or rubber bands that appear worn. Do not wait until they break! The line stows must have between 2 1/2 and 3 inches of line through each stow. Some jumper's make shorter stows because they fear baglock malfunctions. That is not a good idea. Short stows don't prevent baglocks, but really do promote line dump. This is because they only have to slip a little before they are free. Remember, line dump is potentially more dangerous than a baglock, since it can lead to equipment damage, bodily injury, or death.

3. PILOT CHUTE

The pilot chute has a big effect on canopy deployments. The size, type of fabric, length of bridle, apex length, mesh size, and aerodynamic shape all affect the deployment of the parachute. Some pilot chutes have too much drag at terminal velocity. This can cause these problems:
1. They slow the bagged canopy down so quickly that the chance of line dump is increased.
2. When reaching line stretch, the jumper instantly accelerates the canopy back to his speed, since it is attached to him by the fully deployed lines. This is the first force the jumper feels at line stretch. (Moments later, the canopy starts to fill with air and slows down again.) A pilot chute with too much drag will have slowed the bagged canopy down so much that the jumper will experience quite a strong force when the canopy reaches line stretch. The canopy feels this jolt too, and the pack job will be forcefully spread apart by this force. This can cause harder openings, since the now disorganized canopy will inflate more quickly. In extreme cases, it may even open hard enough to cause structural damage to the parachute system, bodily injury, or death.

A Pilot chute with more moderate drag will get the canopy to line stretch with less severe shock to the jumper and the canopy. The line dump problem is also less likely to occur, and the pack job is more likely to be released from the bag in an orderly fashion.

Although a pilot chute with more moderate drag will produce more consistent openings, a pilot chute can have too little drag. This could happen if it is too worn out (high permeability), too small, malfunctioned, or designed improperly. The danger here is obvious. The pilot chute must consistently function correctly. If it does not, a baglock, or a pilot chute in tow may result.
This can happen with a ripcord system, a pull out, or a throw out, if the pilot chute problem is bad enough.
Most, but not all pilot chutes from container manufacturers are compatible with Performance Designs canopies. A pilot chute made from normal F-111 type fabric should be no more than 32" in diameter. We have found 27" to 30" to be adequate for most sport-sized canopies (all measurements are finished dimensions).

Pilot chutes made of zero porosity fabric are more sensitive to specific design criteria, and two of similar size may have widely different drag. They are definitely more sensitive to variations in design, with factors such as mesh size and hole size at the pilot chute base making a big difference in the drag produced. The zero porosity pilot chutes that we have tried that work adequately are between 25" and 27". (The 25" is preferable with most sport canopies.) and have relatively fine mesh. These pilot chutes also seem to be more sensitive to variations in line stow length and line stow tightness than regular pilot chutes.

Collapsible pilot chutes can affect deployments too. The shock cord method of collapsing the pilot chute is tricky to design so that it works consistently. It must be properly designed and use only zero porosity fabric to maintain its calibration. Never use an F-111 shock cord collapsing pilot chute! It can be deadly, because the calibration speed changes rapidly as the fabric changes its porosity. We have seen many F-111 shock cord collapsing pilot chutes cause deployment problems due to inconsistency or outright failure to inflate.

4. DEPLOYMENT AIRSPEED

Anybody who has pulled in a steep track knows that the higher opening speed at pull time, the more potential for hard openings. In fact, any of the factors described above can occur if the jumper's freefall speed is high enough. How fast is too fast? That depends on how much effort the jumper has taken in controlling his packing, line stows, and pilot chute factors.

Smaller jumpsuits and weight vests have helped advance RW skills, but place more demands on jumpers at opening time. You should work aggressively at tracking flat. When tracking, you should grab every bit of air you can! Try to minimize your rate of decent while tracking clear of other jumpers. Then a good flare to stop the forward speed will really help smooth out your openings. Sitting up in a head high position is a common practice. If you like to sit up, try to do it smoothly with the canopy reaching line stretch simultaneously. Don't sit up too early, because you will pick up speed in the sitting up position!

Jumping at high elevation drop zones poses special problems, since the freefall true airspeeds are much higher as altitude increases. This will also aggravate the other deployment factors. At extremely high elevations, a slightly smaller pilot chute on a long bridle may make the other factors easier to control.

Conclusion:
Parachute equipment may fail to operate properly if any part of the system is incompatible or used incorrectly. It is absolutely essential to control all these factors!

Warning Doc. 12-01-04

SYSTEM INFORMATION CARD

The enclosed system information card is a supplement to; and intended to accompany, the current reserve packing data card. It should be completed and placed, along with the reserve packing data card, in the pocket provided on each harness/container system.

It is required, for all systems containing Performance Designs reserve canopies, to have this card included, along with the reserve packing data card.

We believe it is a benefit to have the information provided on this card, easily available to the user, on every parachute system. We strongly recommend the inclusion of this system information card with all parachute systems.

The information required to complete this card may be found on the canopy warning label of all new Performance Designs canopies, or by contacting the canopy manufacturer.

PERFORMANCE DESIGNS, INC.
COLLAPSIBLE SLIDER

[THIS IS AN AMENDMENT TO, AND SHOULD BE KEPT WITH YOUR OWNER'S MANUAL]

If your new Performance Designs canopy came equipped with a collapsible slider, this design will allow you to collapse your slider quickly and easily, without the use of Velcro. As with all of our products, please take a moment to read and understand the operating instructions.

Post Deployment Procedure (collapsing the slider)

1. After deploying your parachute, check the canopy and surrounding air space. ***Locate the two pull tabs at the rear of the slider.***

2. ***Grasp both tabs and pull down and back with a quick movement to the drawstring's full length.*** This will allow the drawstring stops to "lock" the slider in the collapsed position.

3. Release the tabs and fly normally. The slider will remain collapsed.

Packing Procedure (resetting the slider)

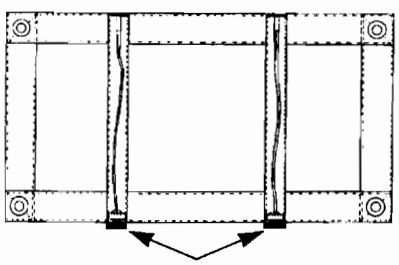
1. **Insert the drawstring stops back into the channel.** This is accomplished by extending the drawstring slightly farther, and tucking the drawstring stop into the fabric channel.

2. **Grasp and pull the fabric channel from opposite ends, extending the slider to its full length and reseating the pull tab in the channel.** This is best accomplished by grasping the bar tacks located at each end of the channel and pulling them apart. Make certain to extend the slider back to its full length, with the pull tab seated in the channel.

3. Repeat steps 1 & 2 for the second drawstring.

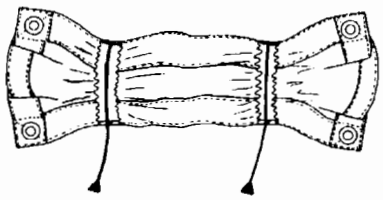
WARNING! **DO NOT PACK WITH SLIDER COLLAPSED. FAILURE TO RESET SLIDER COULD RESULT IN HARD OPENINGS, DAMAGE TO EQUIPMENT, BODILY INJURY OR DEATH.**

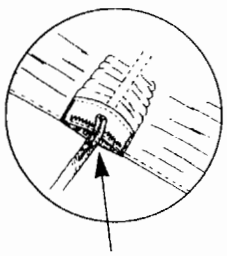
SLIDER RESET



PULL TABS

SLIDER COLLAPSED





DRAWSTRING

Freeflyers, (Head Down, Stand Ups, Long Dives...)

Some body positions (i.e. head down, stand up, and long dives) may enable the user to reach speeds and attitudes, beyond those for which your equipment has been designed and tested. Premature or unintentional deployments in these body Positions, even if you are below the maximum placarded deployment speed, are extremely dangerous.

Your parachute system was designed to operate within specific weight and speed parameters, while oriented in a body position ranging from "belly to earth" to a slightly "head high" attitude. Deployments outside of these limits could cause any/all of the following: extremely hard openings resulting in equipment failure, severe bodily injury, ejection from the harness, or death.

Do not exceed the operational speed or weight limits Of Your parachute system. Youshould avoid deploying in an attitude that your equipment was not designed for.Check with the manufacturer of your harness/container system and parachute if you have any questions regarding their operational limitations.

Performance Designs Ram-Air Parachute Owner's Manual

Performance Designs, Inc.
1300 International Drive
DeLand, Florida 32724
(386) 738-2224

Read this manual completely before assembling, packing or using your Performance Designs canopy.

This manual pertains only to this canopy:

Serial number:_____

Date of manufacture:_____

Line trim differentials of this canopy:

A-B _____

A-C _____

A-D_____

A-Tail, brakes set_____

These differentials may vary +0.5 in. or -0.5 in. from the above dimensions. Other canopies of the same size may have different trims, and this manual may not be applicable to them.

This manual may be revised at any time by Performance Designs, Inc. The only way to be sure this manual is current for your canopy is to check periodically with Performance Designs.

Performance Designs welcomes suggestions of ways to improve this publication. If you feel parts are incorrect or hard to understand, please let us know in writing.

Illustrations: Sandra Williams and Troy White
Design: Lynne Polley

Disclaimer - No Warranty

Because of the unavoidable danger associated with the use of this parachute, the maufacturer makes no warranty, either express or implied. It is sold with all faults and without any warranty of fitness for any purpose. The manufacturer also disclaims any liability in tort for damages, direct or consequential, including personal injuries resulting from a defect in design, material or workmanship or manufacturing whether caused by negligence on the part of the manufacturer or otherwise. By using this parachute assembly, or allowing it to be used by others, the user waives any liability of the manufacturer for personal injuries or other damages arising from such use.

If the buyer declines to waive liability on the part of the manufacturer, buyer may obtain a full refund of the purchase price by returning the parachute before it is used to the manufacturer within 15 days from the date of the original purchase with a letter stating why it was returned.

WARNING

Each time you use this parachute you risk serious bodily injury or death.

You can substantially reduce this risk by: 1) assuring that every component of the parachute system has been assembled and packed in strict compliance with the manufacturer's instructions, 2) by obtaining proper instruction in the use of this canopy and the rest of your equipment, 3) and by operating each component of the system in strict compliance with the owner's manual and safe parachuting practices.

However, parachute systems sometimes fail to operate properly– even when properly assembled, packed and operated– so you risk serious injury or death each time you use the system.

Owner Registration Form

Please take a moment now to fill out this form and mail it to Performance Designs. If you do, we will be able to send you product updates.

We also will learn more about why you chose a Performance Designs canopy. This will help us develop new products that will provide you with parachutes that better fit your needs.

Thank you for your cooperation.

(Please Print)

Name_____

Best mailing address_____

City_____ State_____ Zip_____

Country _____ Phone _____ Fax _____

Canopy model (PD150, PD170, etc.)_____

Serial number (on data panel on tail or on center rib): _____

Did you jump another Performance Designs canopy before ordering this one? **Yes** **No**

Did you jump this model of canopy before ordering it? **Yes** **No**

Purchased from:_____

How many sport jumps do you have?_____

What is your age?_____ Your weight?_____

What canopy did you own/jump before buying this Performance Designs canopy (*Please specify brand and model.*)?

Why did you buy this Performance Designs canopy? (Check the *three* most important reasons):

☐ Price	☐ Ease of landing	☐ Handling characteristics
☐ Reputation	☐ Forward speed	☐ Friends' advice
☐ Pack volume	☐ Availability	☐ Dealer recommendation
☐ Quality	☐ Deployment characteristics	☐ Other—Specify:_____

Again, thanks for your help.

FOLD THIS FLAP FIRST

PLACE POSTAGE HERE
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Performance Designs, Inc.
1300 E. International Speedway Blvd.
DeLand, Florida USA 32724

FOLD THIS FLAP SECOND

About This Manual

It is beyond the scope of this manual to teach you how to deploy, fly, land or maintain this parachute.

The U.S. Parachute Association publishes recommended procedures on learning to jump and using skydiving equipment. We urge you to learn and follow these procedures. We also recommend you obtain instruction from a competent USPA-rated instructor before using this parachute for the first time.

Other countries have similar organizations for instruction. If you are not in the U.S.A. get instruction from a competent instructor that is rated by your country's organization.

Jumping this parachute without first receiving thorough and personal instruction increases the risk of serious injury or death.

Sport parachuting technology and procedures continue to advance rapidly. Although reasonable care has been made in the preparation of this manual, Performance Designs cautions that it may contain information that may be incorrect or behind the current state-of-the-art parachute use.

For these reasons, we urge you to work closely with qualified experts – riggers and instructors – to help you inspect, assemble, pack, use and maintain this parachute.

We also welcome your comments, good or bad, about our products.

Read Before Assembly or Use

Since parachutes are manufactured and inspected by people, there is always a possibility this parachute contains defects as a result of human error. Therefore, the entire parachute system – main and reserve canopies, harness, container, and other components – must be thoroughly inspected before their first use and before each subsequent use.

Parachutes get weaker through time for a number of reasons. They receive wear during packing, deployment and landing. Exposure to many agents, including sunlight, heat and household chemicals, significantly weaken parachutes. The damage may or may not be obvious.

To help minimize the risk of parachute failure and possible serious injury or death, the entire parachute system should be thoroughly inspected at least every 120 days or 50 jumps, whichever comes first. It should be immediately inspected if at any time it is exposed to a degrading element, unusually hard opening, or any time damage may be suspected.

Remember that some chemicals will continue to degrade the parachute long after initial exposure. Regular and thorough inspections are necessary to insure the structural integrity, reliability, and flight characteristics of the system are maintained.

Always know the entire life history of every part of your parachute system. That way you'll know no part has been exposed to an element that may seriously weaken or damage it.

Picking the Right Canopy

It is important for your safety and enjoyment that you match your canopy with your ability and weight. Performance Designs canopies are built in several models that span a wide range of canopy surface area. Any canopy's descent rate and forward speed increases as the weight it is carrying – the so-called suspended weight – increases. The canopy also becomes more responsive as forward speed increases. It also reacts more radically when it is stalled or turned.

Because of these aerodynamic facts, it is unsafe to put too much weight under any particular canopy. Safe and comfortable landings will be difficult to obtain, even for experienced jumpers under ideal conditions. Less experienced jumpers will have even a harder time and be at greater risk.

Determining the "wing loading" of the parachute you intend to jump or buy is a good guide to matching your weight to a particular canopy.

Wing loading is easily calculated by dividing the total suspended weight in pounds by the surface area of the canopy in square feet. Total suspended weight is the weight of the jumper plus all his clothing and gear – including the main parachute itself.

The surface area of Performance Design canopies is printed on the data panel, on the center cell rib, or on the center cell top surface near the tail. (Be sure to actually check the data panel – *canopies of different sizes may look the same.)*

A typical ready-to-jump sport piggyback (rig and both canopies) weighs 20 to 30 lb. Add this, plus the weight of your jumpsuit, clothing and accessories to your body weight to get the total suspended weight.

For example, a jumper who weighs 165 lb. with his jumpsuit on and who jumps a packed rig that weighs 25 lb. would have a suspended weight of 190 lb.

Here's an example of how to calculate wing loading of a 210 sq.ft. canopy and the jumper used in the example above:

190 lb./210 sq.ft = 0.9 lb./sq.ft.

Calculate the wing loading now for the canopy you intend to jump.

If this figure is below 0.7 the parachute will be relatively docile and easy to lead. It will also have reduced penetration into the wind.

If this figure is between 0.7 and 1.0 it will turn fast and go fast. It will require skill to land well in many weather conditions or at high altitudes. Be sure your skill level is up to the demands of this situation.

If the wing loading is greater than 1.0 lb./sq.ft. you are exposing your self to a dangerous situation. Turn rates, forward speed and rate of descent will all be very high. Control range may be very short with stalls happening very abruptly with little warning. Normal landing techniques may not work. Extra speed on approach to landing may be required to get enough flare to stop your rate of descent. Therefore, a front riser approach or hook turn may be required, either of which are very dangerous.

Performance Designs does not recommend that anyone jump a canopy that will result in the wing loading exceeding 1.0 lb./sq.ft.

It also is useful to compare the wing loading of a canopy you intend to jump with the wing loading values of parachutes you've been jumping. If the difference is great, you should expect the new canopy to perform very differently than the ones you've jumped before.

Introductory Jumps

Even if you are familiar with ram-air parachutes, including Performance Designs canopies, your new parachute may handle differently.

Therefore, always make several jumps with the sole purpose of getting to know your new parachute. Pick a day with favorable wind conditions and jump by yourself.

Open high and find out how the canopy flies. Try slow turns and fast turns from no brakes, quarter-brakes, half-brakes, three-quarter-brakes, and full brakes. Determine if the canopy helicopter turns (stall turns) and, if so, under what conditions. Find out how the canopy recovers from various types of stalls.

Stall the canopy several times and see how this happens both from full flight and minimum air speed. Turn the canopy by pulling on the front or rear risers rather than the toggles.

Fly some practice approaches and flare the canopy as you would when you land it. Notice how far you must depress the toggles to get a landing stall and how quickly this stall occurs.

Keep track of your location relative to your intended landing area as you "wring out" your canopy so you won't drift too far away. Discontinue your experimenting when you've descended to 1000 ft. above the ground.

Plan and execute a conservative landing approach into a large unobstructed landing area. Steer, flare and land the canopy as you were taught by your instructor. Since you might misjudge your early landings, be prepared to do a safe parachute landing fall rather than a stand-up. Most jumpers underestimate how far they will travel over the ground during the landing flare. Make sure you have enough open area ahead of your intended touchdown point.

Such introductory jumps will help you discover what makes your canopy respond violently. The canopy will let you know that it is about to do something violent by its "feel." You must be experienced in these flight modes to know what it is telling you.

Knowing this will help you avoid these situations close to the ground when they can be quite dangerous.

Swoop Landings

At most drop zones there are some jumpers who like to do high approach speed (swoop) landings. These landings look impressive, traveling long distances inches off the ground and then going back up before landing. The problem is that these landings can be very dangerous for the jumper and anyone else around the jumper.

Many of these swoop landings are started by a low turn. If timed incorrectly the jumper can hit the ground hard enough to be fatal. Many jumpers have been hurt by having another turn into them.

To minimize the danger involved in skydiving you should avoid all turns close to the ground, and turns that could bring you close to another jumper in the air. Performance Designs recommends that all jumpers limit their turns to only minor course corrections below 500 feet. If you insist on performing a swoop landing make sure you are alone in the air. Do not attempt a swoop landing if there are other jumpers in the air or the landing area.

The following advice is not intended to recommend that you try swoop landings, rather, they are only included because we recognize the fact that some people will try to do some swoop landings, even though Performance Designs Inc. recommends not to. We have included this section to minimize the risk to those that are going to attempt swoop landings.

Do not try any swoop landings until you are very familiar with your canopy and the landing area. Even people who are very skilled occasionally hurt themselves. Start out slowly. You do not need any more speed than full glide when first learning. Never try a swoop landing unless the weather conditions are suitable. As you become more familiar with your canopy, you may want to start using a faster approach. If so, increase your speed in small increments over many jumps. Most people get hurt by trying too much too soon. Try several practice approaches while at a high altitude, going through everything up to landing. Do not attempt a high speed landing until you are sure you can deal with the high initial sink rate.

The best weather for practicing is a smooth, calm, low wind day. On such days, the canopy will be relatively stable and will be responding only to pilot control. It is important to avoid any possibility of the canopy being influenced by changes in wind direction or speed.

The idea in a swoop landing is to skim your feet across the ground or to make the canopy go back up. There is a very small section of the control range of the canopy where this is possible. If you pull the toggle down just a little beyond what is necessary to skim across the ground the canopy may start to climb. However, just a little more toggle may cause the canopy to do a high speed stall. In other words, if you pull your toggle down any more than is necessary you will pass right through the control range you want. The result of this could be dangerous. The exact position of this small area of the control range of the canopy is different on almost every jump.

You must have a complete and intrinsic understanding of your canopy to know exactly what to do for every approach.

Remember that the last thing you do in a swoop landing is land. If you let yourself get in a position where the canopy does not have enough air speed to fly, you drop from that altitude. If that happens to be ten feet high, you fall ten feet!

Once you have mastered the canopy, you may decide to try approaches at high air speeds. It's logical that the faster you go, the harder you will hit, so be careful. There are three methods to gain extra airspeed on approach: front risers, front riser hook turns and toggle hook turns.

Pulling down both front risers on a straight in approach is the least dangerous method. A minimal pull down on the front risers (less than two inches) will result in a very large increase in airspeed (increasing the flare power on almost any landing). The flare then begins with a smooth release of the front risers, and is continued by smoothly pulling the toggles down as much as necessary. The altitude to begin the flare varies with each approach and how fast the flare is executed. It takes practice to determine these factors. This practice can be hazardous to your health! When using front risers to gain extra speed, never let go of the toggles for any reason. Also, be sure not to use front risers in gusty or turbulent winds. Pulling on front risers in these conditions could cause your canopy to collapse.

Front riser turns are very dangerous. The forward speed gained with this maneuver is much more dramatic than with a straight front riser approach. The big disadvantage is that it is much more difficult to judge correctly. If you misjudge this type of approach, you could seriously hurt yourself. Performance Designs recommends that you do not try this.

Toggle hook turns are the most dangerous of the three options and offers no advantage in performance. Because both the bank angle and the altitude at the start of the turn must be exact, toggle hook turns are very difficult to perform correctly. They are also very unpredictable in turbulence. **Do not try a toggle hook turn under any circumstances.**

A Note About Slope Soaring

Parachutes are frequently used for slope soaring or paragliding. While this is an acceptable use, it can be very dangerous. The following guidelines will reduce the danger:

1) Obtain competent instruction before attempting any slope soaring. Many countries have organizations that certify instructors. In the U.S.A. the American Paragliding Association or the United States Hang Gliding Association can direct you to competent, rated instructors.

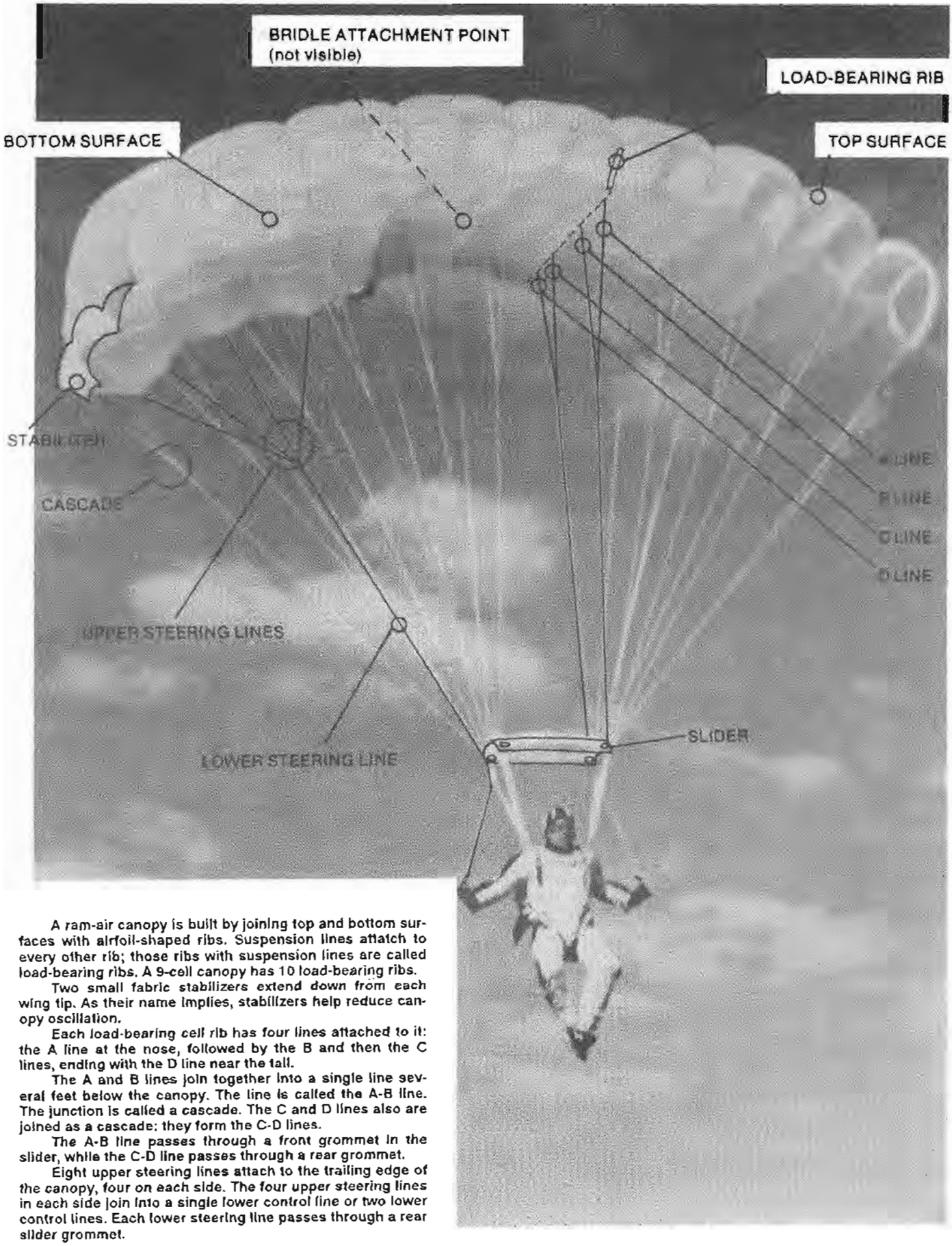
2) Know the site. Never be the first one to launch at a site. Talk to several people who have used the site before under similar weather conditions. Make sure the site is free of turbulence. Turbulence may collapse your canopy and you may fall all the way to the ground, causing severe injury or death.

3) Know the limitations of your canopy. Glide ratios, minimum sink rate, launch speed, flight speed, tolerance to turbulence and recovery characteristics are just some of the things you need to know. These all vary according to wing loading, jumper weight, and canopy type. You *must* be very familiar with this canopy before attempting any paragliding. Canopies designed specifically for paragliding may perform much better than this canopy. Therefore, do not judge the suitability of a site based on the performance of a paraglider.

4) Make sure that you can make the landing area before you launch. Check the flight path for obstacles. Don't launch if there are any dangerous obstacles along your flight path.

5) Inspect your parachute frequently and thoroughly. In skydiving the jumper structurally tests his parachute every time he deploys it. If there is any structural deficiency the opening shock will normally cause failure at an altitude where he can safely deploy his reserve. A slope soaring pilot is not so fortunate. Turbulence can collapse a canopy and the subsequent opening shock can be hard enough to cause a failure. This could happen at an altitude that is too low for the reserve to work.

6) We recommend you use a ballistic or rocket deployed reserve designed specifically for paragliding. Because paragliding reserves are frequently required to work at very low altitudes, a skydiving reserve is not adequate.



A ram-air canopy is built by joining top and bottom surfaces with airfoil-shaped ribs. Suspension lines attatch to every other rib; those ribs with suspension lines are called load-bearing ribs. A 9-cell canopy has 10 load-bearing ribs.

Two small fabric stabilizers extend down from each wing tip. As their name implies, stabilizers help reduce canopy oscillation.

Each load-bearing cell rib has four lines attached to it: the A line at the nose, followed by the B and then the C lines, ending with the D line near the tail.

The A and B lines join together into a single line several feet below the canopy. The line is called the A-B line. The junction is called a cascade. The C and D lines also are joined as a cascade; they form the C-D lines.

The A-B line passes through a front grommet in the slider, while the C-D line passes through a rear grommet.

Eight upper steering lines attach to the trailing edge of the canopy, four on each side. The four upper steering lines in each side join into a single lower control line or two lower control lines. Each lower steering line passes through a rear slider grommet.

Improving The Performance of Your Canopy

The most effective methods of increasing performance involve reducing drag or wind resistance. The following factors will, to a large extent, determine the performance you get out of your canopy.

1. Three decisions you made at the time of purchase determined the performance of your canopy. (1) The size was the most important. Smaller canopies are faster, but have a noticeably lower glide ratio. (2) The Microline option improves the performance over the standard Dacron line. (3) Large grommets will allow you to pull the slider down below the links, allowing the canopy to spread out more.

2. The performance of your canopy is greatly affected by how it is set up. The most effective thing that you can change here is the pilot chute drag reduction. There are several systems available for collapsing the pilot chute. The cheapest and most reliable method is to remove the main bridle bag stop and have a large grommet installed in the main deployment bag. However this method causes components to wear faster. Another method used is a pilot chute with a bungee center line. This method usually works, however if the pilot chute fabric increases in porosity the pilot chute may fail to open at deployment time. This can be a very dangerous malfunction. Also the pilot chute may open while in flight causing unpredictable changes in flight path. Yet another method is a retracting center line system. This method works well, however it requires the center line to be replaced regularly, and may fail to open at deployment time if packed incorrectly. The resulting malfunction is very dangerous.

3. How you use the canopy will effect the performance you get out of it. The slider drag may be reduced by keeping it from fluttering. On some models, a tie strap is installed on the slider for this. On canopies without this feature, the slider flutter can be reduced by wrapping up the slider with a pair of goggles. If you do use one of these methods, be sure the slider is freed before you start to pack the canopy.

Performance Designs recommends that you leave the slider above the links. Some jumpers bring the slider past the toggles, down to the bottom of the risers, and stow it behind their neck. This does result in a slight increase in performance, however, it is dangerous. If the slider should inflate or move from its stowed position it can obstruct your vision.

Assembly

Your canopy should be assembled by a properly certificated rigger. Before you begin, be sure the risers, toggles, bridle, deployment bag, pilot chute, harness, container and other items are compatible with your Performance Designs canopy and each other.

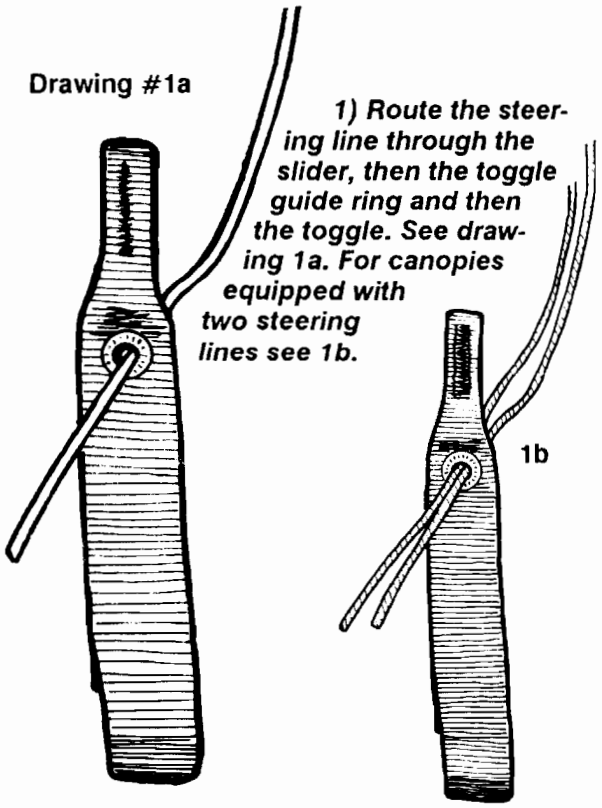
Some toggles, for example, will not work properly on certain types of risers.

Assemble your system in accordance with the owner's manual for your rig.

The instructions below are for attaching toggles that have a grommet in the center to canopies with Microline. If another type of toggle is used consult the container manufacturer for proper installation. These instructions will work for Dacron-lined canopies, however the rig manufacturer's instructions may produce a better looking installation.

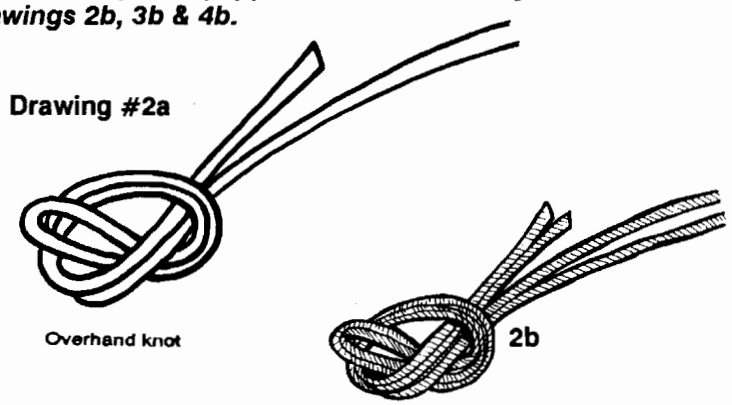
Two common problems that may happen if the toggles are installed improperly are, a) the toggle knot getting caught on the guide ring, and b) the knot slipping. Be sure that your installation is safe. The container manufacturer's instructions may not be compatible with this canopy.

Canopies with two steering lines are attached to the toggles in the same manner as canopies with a single steering line. The two steering lines are routed and tied together as if they were a single line.

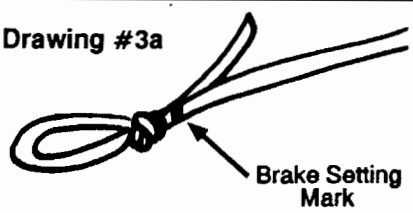


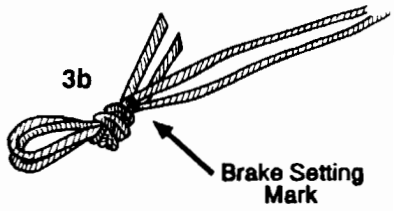
2) Tie an overhand knot in the steering line so that the toggle mark is at the start of the knot, and the loop is a snug fit around the toggle. See drawings 2a, 3a & 4a. For canopies equipped with two steering lines see drawings 2b, 3b & 4b.

Drawing #2a



Drawing #3a

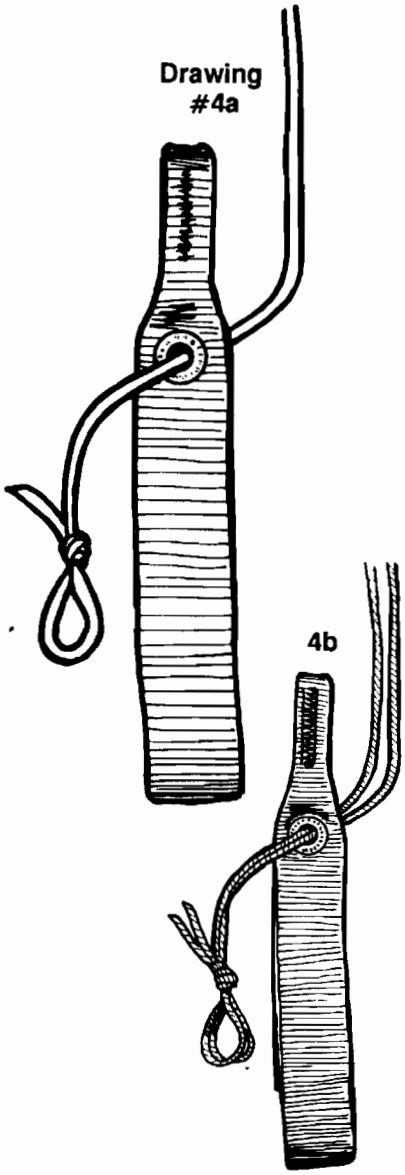




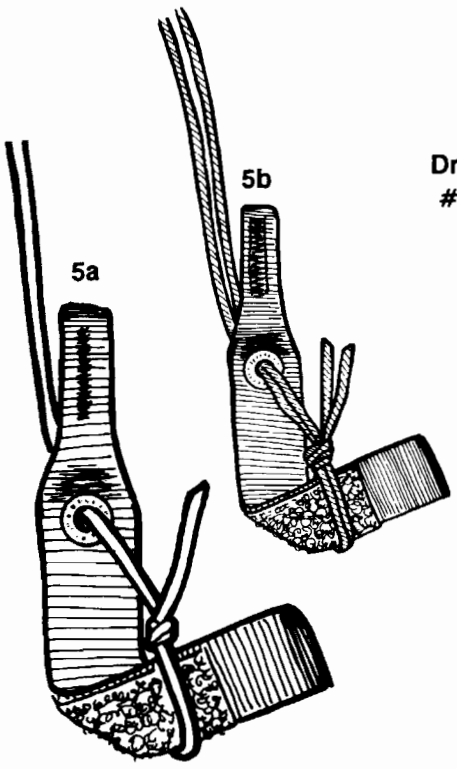
3) Thread the toggle through the loop in the steering line. See drawing 5a. For two lines see 5b.

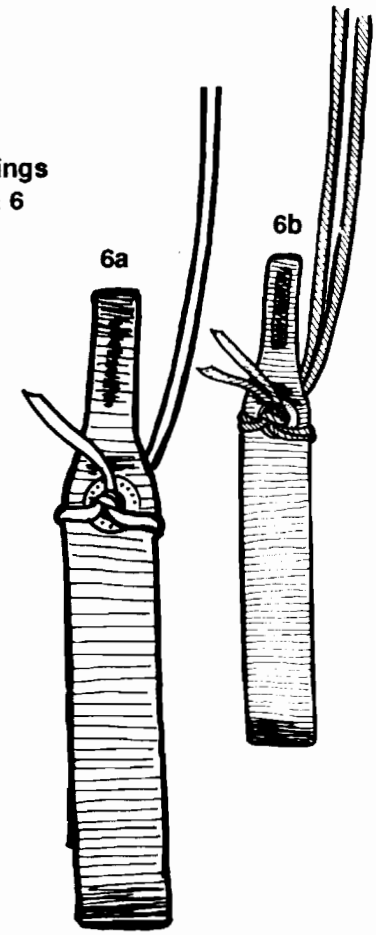
4) Pull knot up to the toggle grommet. Note that the knot and the steering line guide ring are on opposite sides of the toggle grommet. This prevents the knot from getting caught on the toggle guide ring. See drawing 6a. For two lines see drawing 6b.

Drawing #4a



Drawings #5 & 6





Periodic Inspection Procedure

(Performed at assembly and after every 50 jumps or 120 days, whichever comes first.)

As mentioned above, your Performance Designs canopy must be inspected thoroughly before it is jumped the first time and periodically thereafter. This procedure is more thorough than the inspection which should be completed each time the parachute is packed.

You or your rigger should inspect your parachute system in a clean, well-lighted area that will allow you to spread the main canopy out.

Here is one recommended procedure for inspecting your Performance Designs main canopy. Consult the owner's manual for your rig and other components for instructions on inspecting them.

It's best to inspect your canopy in a careful, systematic way. We recommend starting at the top of the canopy and working down to the risers. You should leave the canopy attached to the rig.

1. Bridle attachment. Check to be sure the bridle is correctly attached to the canopy. Check the integrity of the canopy fabric and reinforcement tapes in the area where the bridle ring is attached.

2. Top surface. Spread the canopy out on its bottom surface and inspect the top surface. Look for rips, stains, or failed seams. Check the fabric strength by grabbing a handful of fabric in each hand and trying to tear the canopy with a moderate tug.

3. Bottom surface. Turn the canopy over and spread it out to inspect the bottom surface. Check for rips, stains, and failed seams. Check the fabric strength (see #2 above). Check the line attachment points.

4. Inspect each rib from the leading edge to the tail by looking inside each cell. Pay extra attention to line and bridle attachment points.

5. Lay the canopy out neatly on one side, stacking each rib on top of the others. Check that all lines in each line group are the same length and that the trim differential between each line group is correct for this canopy. Check the condition of the stabilizers and slider stops.

6. Suspension lines. Check the full length of each line for damage and wear. Look for fraying at all cascades (the Y-shaped junction of two lines) and where each line attaches to the connector link.

7. Slider. Be sure the fabric isn't torn, that the grommets are undamaged and have no sharp edges, and that they are securely attached to the slider.

8. Risers. Be sure the barrels of the connector links are tightened and the slider stops are properly positioned.

The toggles must be installed correctly and must match the guide ring and Velcro on the risers. Checking this installation must be done by a rigger. Be sure the riser release system is assembled correctly and that it will function when activated.

9. The rest of the assembly. Follow the instructions in the rig manufacturer's owner's manual to inspect the rest of your parachute system.

Cleaning Your Canopy

Standard Materials

Avoid washing or cleaning your canopy if at all possible. Cleaning the material will increase the porosity, causing reduced performance. Only clean areas that are contaminated with a substance that will degrade the material. Mild soap and water will remove most contaminants. If necessary, mineral spirits may be used for grease or oil. Do not use any other cleansers. Do not use cleansers that contain bleach. Avoid agitating the canopy, especially when wet. Agitation will cause a reduction in canopy performance.

ZP3

The ZP3 fabric is not affected by water. However, the reinforcement tapes may be. All tapes used in these canopies are pre-shrunk at the factory to make them more dimensionally stable.

However, if they get wet this does not mean that they will come back to the exact same size when dry. Small changes in lengths may make a large difference in canopy performance. To maintain the best performance, avoid getting the canopy wet. Water jumps are not recommended.

If you need to clean your canopy, please wash only dirty or contaminated areas. Use a mild soap and water only. Oil and grease usually do not penetrate the coating surface so solvents are not normally necessary. Also, some solvents may affect the coating. Avoid getting tapes wet if possible. Do not machine wash.

Storage

Store your parachute in a cool, dry place in a container through which light will not pass. This will prevent the permanent and difficult-to-detect damage caused by ultraviolet light from sunlight and other sources.

Certain other agents – notably acids – will quickly cause great damage to your parachute. Do not store you parachute where it might come into contact with such substances. For example, automobile trunks contaminated long ago with battery acid have destroyed many parachutes.

Pre-Packing Instructions

Introduction

Today's ram-air canopies are very reliable parachutes. If a ram-air has straight lines – that is, if it is assembled correctly and untangled after the last time it was jumped – it will usually inflate even if folded in ways that are quite unusual.

In other words, it is difficult to pack a ram-air main canopy so it won't open.

We're not saying other packing methods won't work with your Performance Designs canopy. But the method shown here will probably help your canopy open more consistently.

Before You Begin

Where you pack your Performance Designs canopy is important.

Since sunlight irreversibly damages nylon parachutes, an indoor or shady area is best. Packing in the sunlight is unavoidable at most places, so try to reduce your canopy's exposure to direct sunlight as much as possible. Cover it with a packing mat or jumpsuit while you "debrief" a jump or critique a student.

Packing on concrete and asphalt should also be avoided because they will wear the fabric, lines and fittings that are used to build your parachute system. A dry lawn is best.

Packing behind a building or van will make packing easier because it blocks the wind.

U.S. FAA regulations require that a main parachute be packed by either an FAA-certificated rigger or the person who will jump it. Other countries may have similar regulations.

A Word About Help

When you're learning to pack, never hesitate to ask a rigger or your instructor for help. They will show you tips that will make the process faster and easier. Be sure they refer to this manual, however, as they might not know our packing method.

Read The Manual First

Read these packing instructions completely before you begin. Doing so will give you a better idea of what you're doing, and it will help you go a little faster.

Packing Canopies Made of ZP3 Fabric

Canopies made from ZP3 can be packed just like any other similar canopy. If you prefer to flat pack, and have been getting good results with a similar canopy, this method should work with your new canopy. There are many different pack jobs currently being used. We recommend the pro-pack detailed in the owner's manual.

This pack method consistently results in soft, on-heading openings, with minimum risk of canopy damage. Others may not work as well. If you try a different pack method, you do so at your own risk. If you use a side or book pack, start at the tail and work forward to squeeze the air out.

Packing a canopy made of ZP3 is a new skill that must be learned. At first, it will be more difficult to pack than canopies made out of conventional materials. However, with practice it will become just as easy. You can make the pack job considerably easier by getting a bag that is slightly larger than your main container. It is easier to squeeze a small amount of the air out after the canopy is in the bag. (Consult the container manufacturer about this.)

The key to making the job easy is to pack fast and accurately. Each fold or roll must be done quickly and correctly the first time. This will only come with practice. Packing does not hurt the canopy, so please practice until you are good at getting a neatly folded canopy into the bag before you start jumping the canopy.

The fabric has a memory and always tries to open back up. Once you start, you must continue until the canopy is in the bag and the first locking stows are secure. You can't waste time at any point in the packing procedure because this gives the canopy time to move around, form a big mess, and you will have to start over.

After the folding and organizing portion that is done while standing is complete, you should roll the tail as tightly and as far as possible. Be careful not to let the tail unroll while squeezing the air out. If you kneel on the canopy facing the pilot chute attachment just above the warning label you will be in a better position to control this. Slowly lay down on the canopy while still containing it with your hands. The only place for the air to leak out is the stitch holes, so go slowly. If you go too fast, the air will blow the pack job apart.

Sabre Note:

Sabres are designed for a slow-to-medium speed opening when packed as described in the P.D. manual – with each side of the nose rolled four complete turns towards the center. Do not tuck the nose into the center cells. The new airfoil design causes the center cells to form a pocket that can hold the rolls there during opening. Additionally, tucking the end cells into the center cells will result in unreliable opening times, with some very long snivels. Repeat: Do not do this.

Inspection

(Performed before each packing.)

You must inspect your parachute system each time you pack it. The inspection takes only a few moments and will help prevent malfunctions and other problems. The inspection is best done when the rig and canopy are stretched out on the ground prior to packing. (The procedure outlined below is different than the thorough inspection that must be performed periodically and when the parachute is first assembled or if damage is suspected. The thorough procedure was presented earlier.)

If you discover any worn or improperly rigged components, bring them to the attention of an FAA certificated rigger before jumping the system again.

During your inspection of the entire system, pay special attention to the items listed below.

Any damaged or worn parts must be repaired or replaced before jumping the system again.

Start with the harness and container and work up to the canopy and pilot chute. Although the owner's manual that came with the rig contains specific inspection procedures, be sure to check the items listed below.

Reserve. It must be sealed and in date. The ripcord pin(s) must be seated properly and not bent. The cable must move freely in its housing. The ripcord handle must be properly stowed in its pocket. If the rig is equipped with an automatic ripcord release, it must be installed and calibrated correctly.

Harness. Inspect the entire harness for broken stitches and excessive wear.

Main Container. The locking loop (or cones) must not be worn, as a problem with the locking device can result in a premature opening, or a locked container.

Risers. Check the riser releases carefully. They must be installed and assembled properly. If your harness has 3-Ring releases, be sure the white locking loop is not worn (it must pass only over the smallest ring). Be sure the release cables are inserted correctly in the white loops.

Check the steering lines and toggles. Look for damage, loose knots and slipping toggles. (Serious injuries could result if an incorrectly attached toggle detaches from the steering line during the landing flare – don't let it happen to you.)

Check Velcro for wear.

Check the connector links. The threaded barrels must be securely tightened and not cracked.

Slider. Be sure the slider isn't twisted, and that its grommets are free of nicks or burrs that can damage the suspension and steering lines.

Suspension and Steering Lines. Inspect these lines for wear. Be sure they are "continuous" (not tangled). Each must go straight from its link to the canopy without wrapping around other lines. The risers must not be twisted, either.

A tip: Pick up your canopy neatly after each landing, and lay it down neatly when you reach the packing area. Doing this will make your packing go faster because the lines will most likely stay "continuous" (or not passed through each other, as can happen if you walk though some lines after landing).

If you find any incorrectly routed or twisted lines, it is usually better to leave the risers attached to the harness while you correct the problem (unless the risers were attached incorrectly to begin with). Disconnecting the risers usually makes it more difficult to straighten things.

Canopy. Be sure the canopy is not on backwards. Inspect it for tears, especially where the lines and pilot chute bridle attaches. (You should periodically look inside the center cell to inspect this junction.)

Deployment Bag, Bridle and Pilot Chute. The owner's manual for these items is the best source of inspection information. Tears or failing seams in the main pilot chute are especially hazardous. So is a worn bridle or one that is too short.

After packing your canopy a few times, you'll be able to combine the above inspection procedures with the packing procedures – you'll inspect it as you pack it.

Packing Procedures

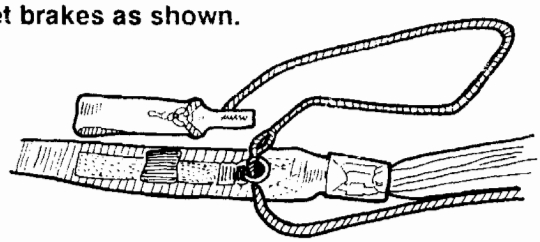
Stretch your parachute system out on the ground with the rig laying with the containers facing up. (If someone were wearing your rig at this point, he'd be lying face down with his head towards your canopy.) Pull the lines straight before setting the rig down.

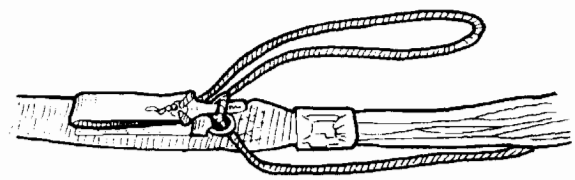
Brake Setting Procedures

After the parachute system has been inspected, stow the brakes according to the instructions provided by the manufacturer of your rig. (Different rig manufacturers use slightly different methods to set the brakes.)

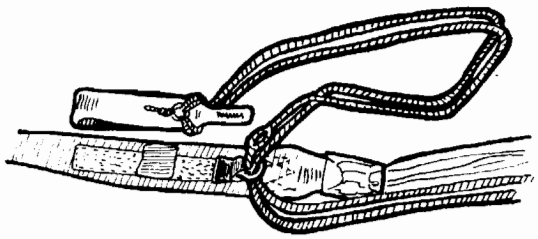
Canopies with dual steering lines (two lines per toggle) have brakes set on only the lines that contain brake loops. If two brake loops are present use them both.

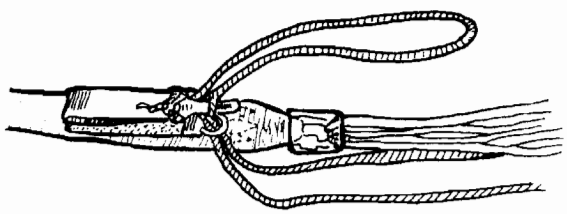
Set brakes as shown.





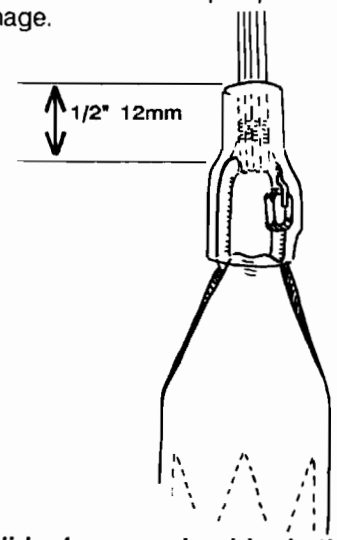
Set brakes as shown for two lines.



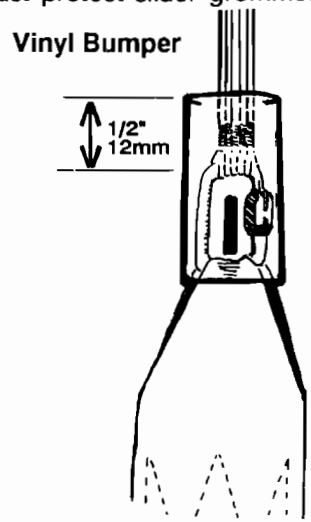


Link Bumpers

Check slider bumper position. It must protect slider grommet from link damage.



Slider bumper should grip the link firmly so that it cannot slide off the link during deployment.

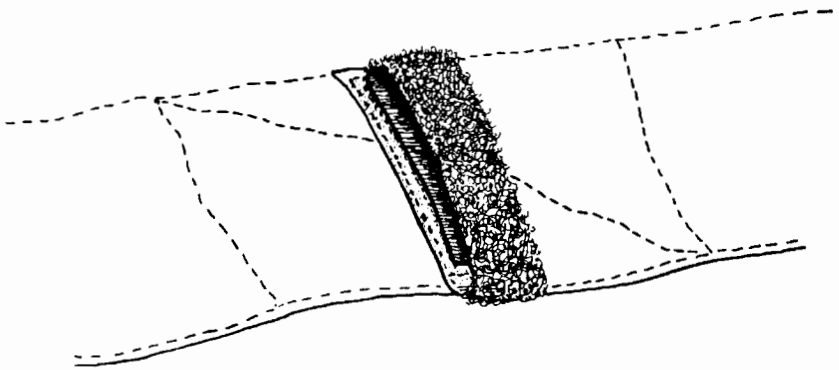


Check that hand tack secures bumper in correct position.

Slider Preparation

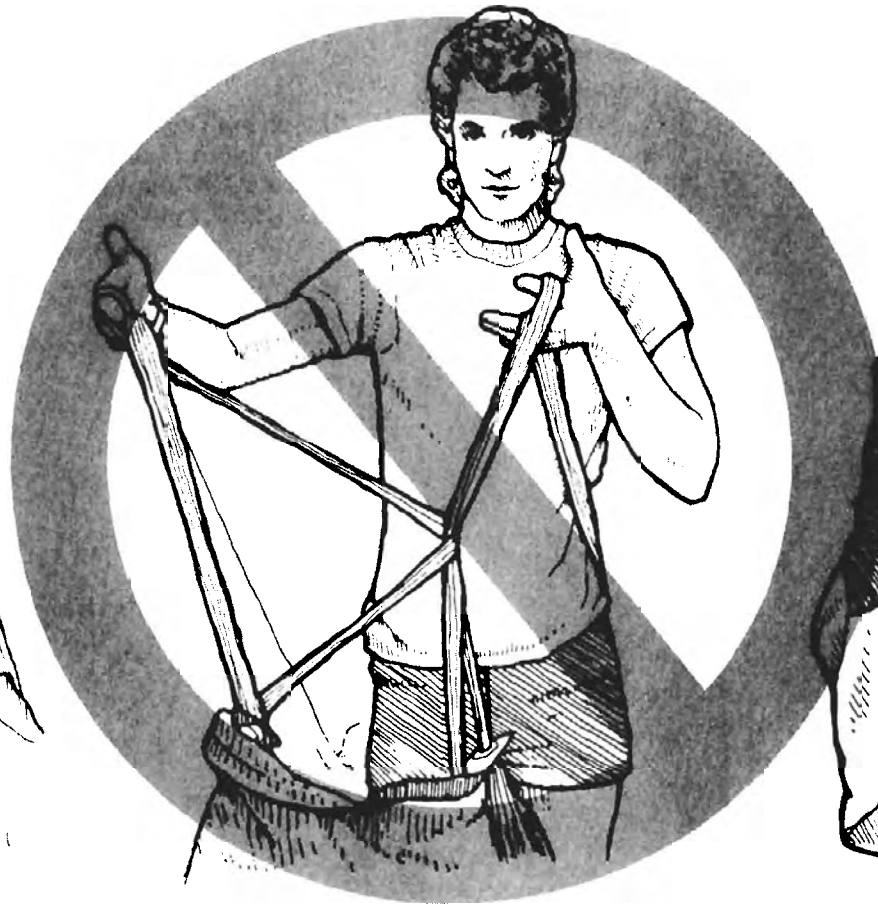
On some canopies there is a small piece of Velcro on the slider. This is to wrap up the slider during flight. It stops the slider from flapping, makes it quiet, and improves the glide slightly.

This Velcro must be stowed as shown below before packing. Failure to do so may result in an excessively hard opening, canopy damage, malfunction, and/or severe injuries to the pilot.



Folding the Canopy

1) Crouch next to the risers and face your canopy. Slip the fingers of your left hand between each left-hand riser and between the left-hand steering line and the risers. Do the same with your right hand. The idea is to have each line group and each steering line occupying a slot between two fingers. Stand between the right and left-hand riser groups and grasp the lines as shown. Be sure there are no twists in the risers. Start moving up the lines, allowing them to slide between your fingers. Push the slider ahead until you reach the bottom of the canopy.



2) At this point, it's possible to determine if your canopy and lines aren't straight. If there are twists in the lines as shown, this means your rig did a "loop" through your risers at some point. To fix this, drop the lines, stretch the canopy and lines out again, and straighten the entanglement out. Get help from a rigger if you have any questions. Do a line check again to make sure you have done it correctly.

3) If the lines look something like this, then a steering line or riser group passed around everything else.

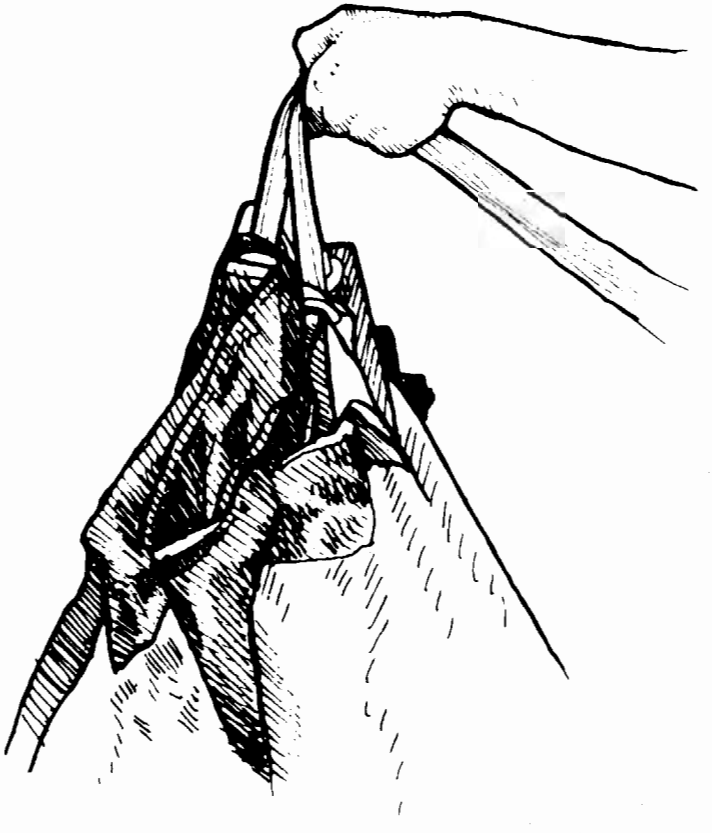
A steering line that passes around everything else will result in a malfunction that will almost surely require a breakaway.

If you don't know how to fix this, get qualified assistance.

4) When you reach your canopy, pull both hands apart as far as the slider will allow. Shake the canopy a couple of times to settle everything.

If the canopy is clear there will be four distinct line groups going all the way to the stabilizers with no lines crossing each other and no twisted lines.

5) The nose openings should be facing the rig and the tail should be farthest from the rig. If the reverse is true, double check to be sure the rig is container-side up (the back pad is on the ground). If the rig is positioned correctly and the canopy is not oriented as described above, then the canopy was attached to the harness backwards!

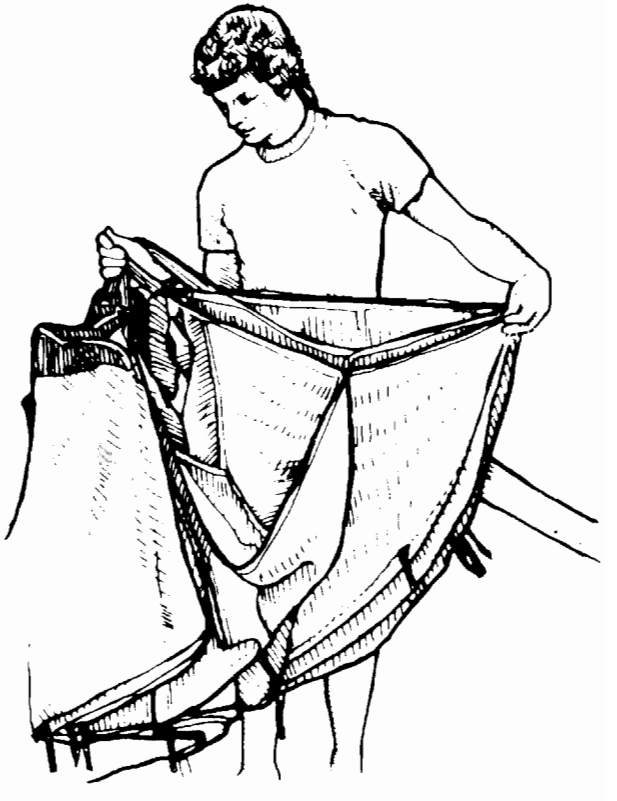


6) Now step to one side outside the lines and transfer the lines to one hand so that the left and right sides of the canopy hang at the same height. It isn't necessary to keep the line groups separated by the fingers of your hand because you've already determined the lines and canopy are straight. Your canopy should look like the above illustration.

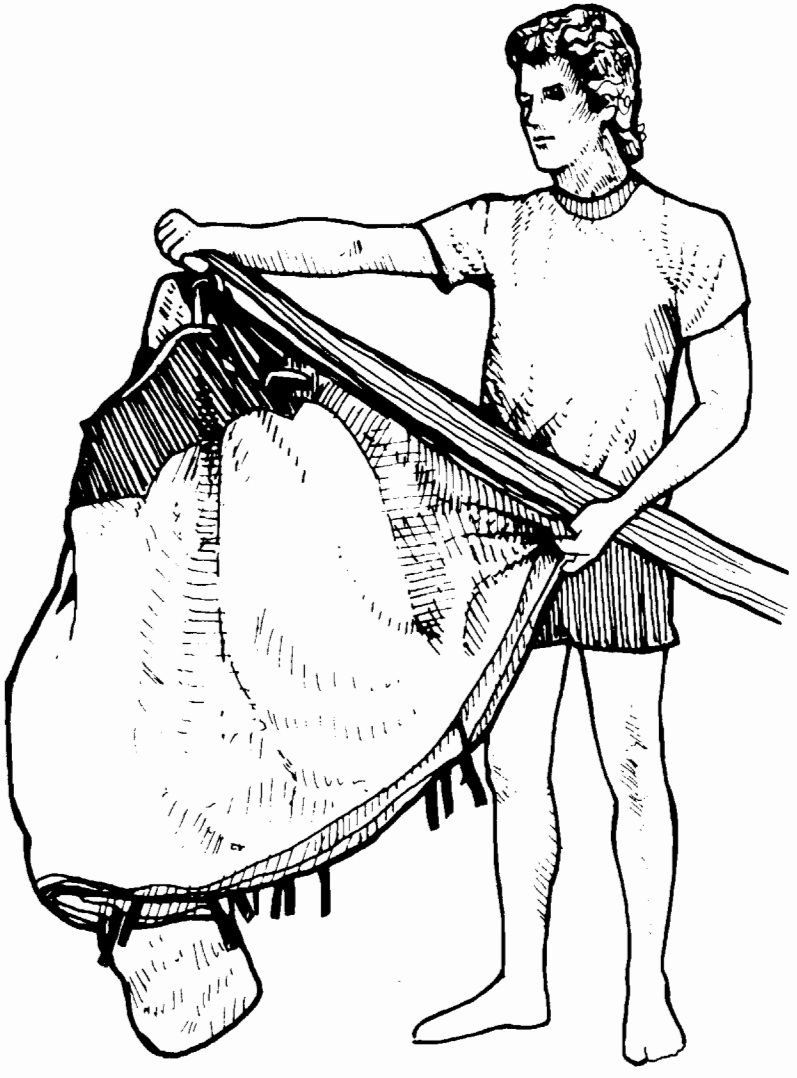
All lines should be kept taut and the nose should still be facing the rig. The slider should be against the slider stops on the stabilizers.

7) Starting with the end cell nearest your legs, flake the entire nose with one hand as shown.

8) Pull each cell completely out, and keep it in your hand.

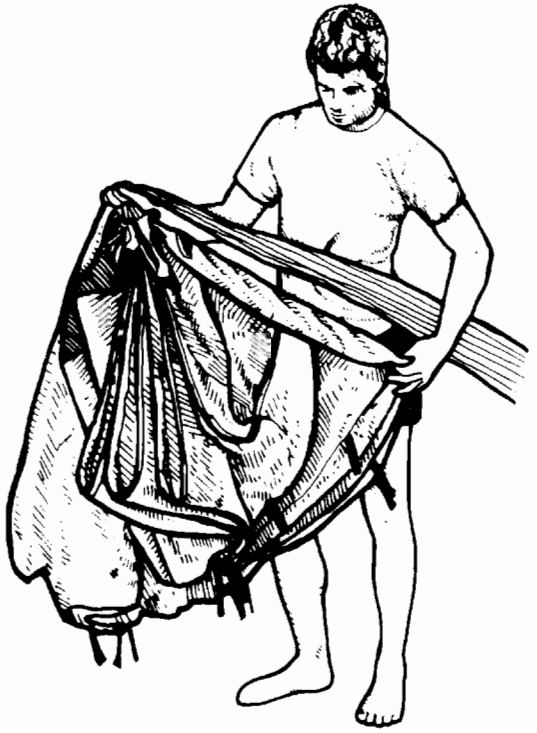


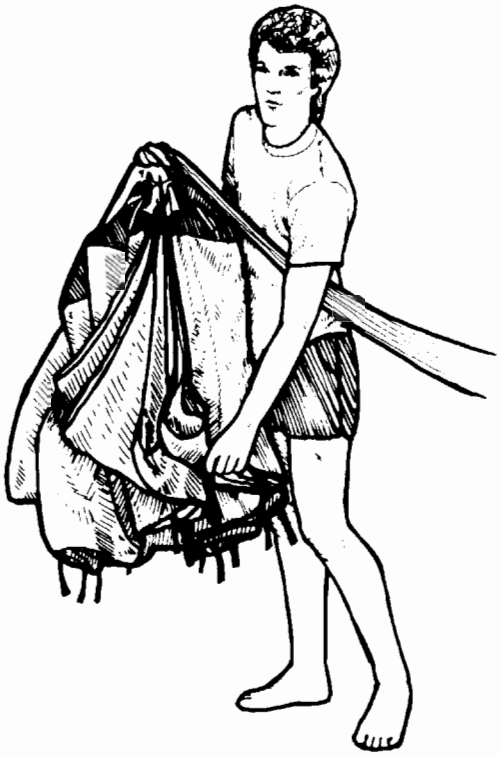
9) Then pick up the next, taking care not to miss any until all of them are in your hand.



10 & 11) When you have the entire nose flaked, tuck it between your knees and hold it there.

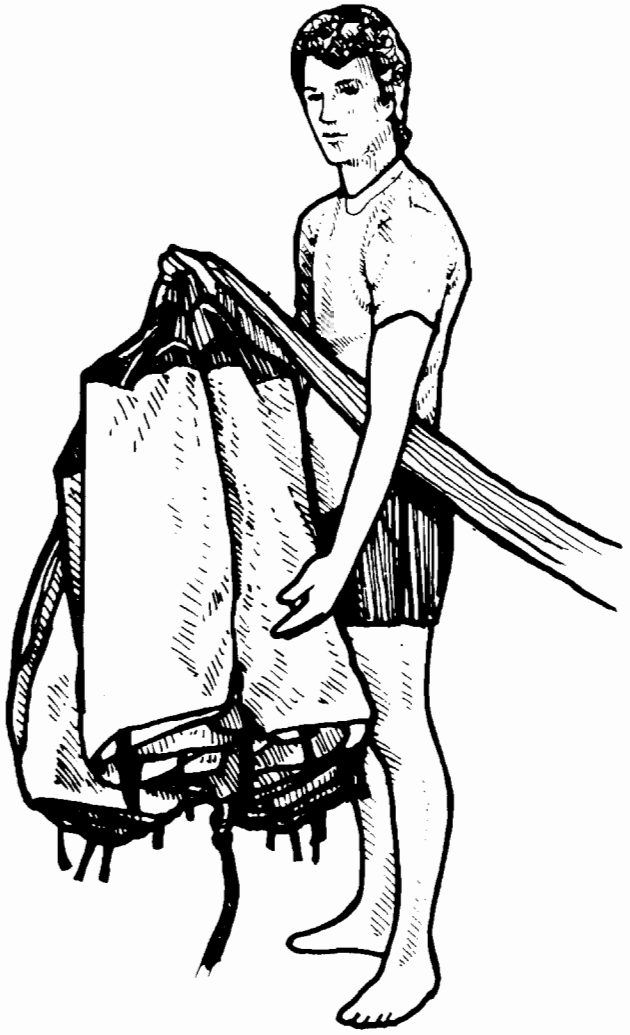
If your canopy is new, or if it tends to open uncomfortably fast, then follow steps 12 through 15. If it tends to open too slowly, skip to step 16.





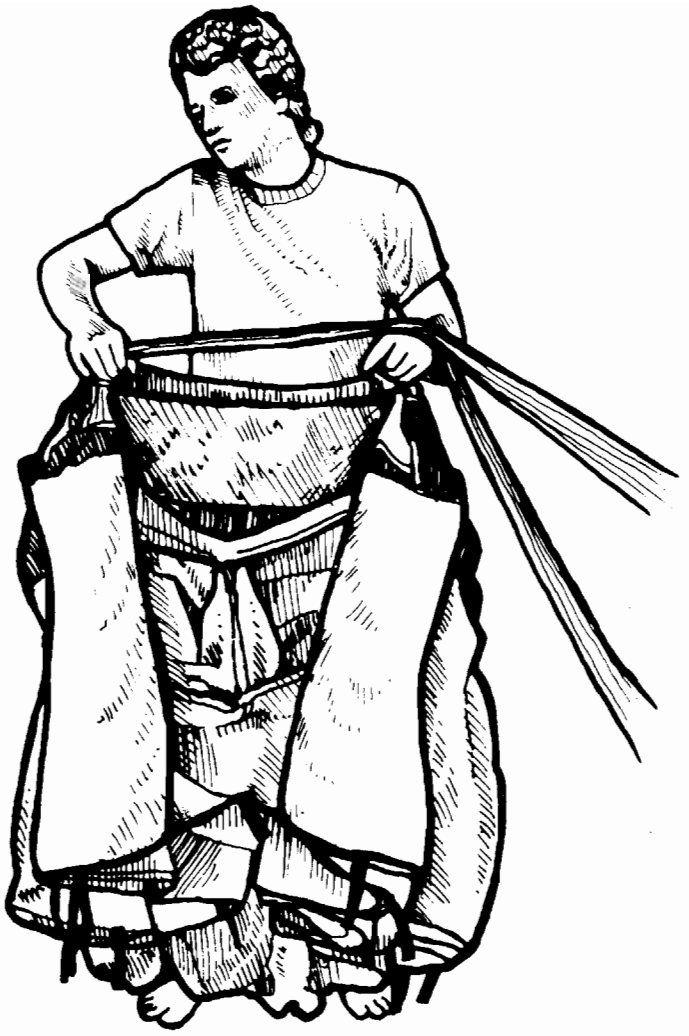
12 & 13) Loosen your knee grip on the nose of the canopy. Find the very middle of it (by running your hand down between the front two slider grommets; exactly half the lines will be on one side and half on the other). While leaving the very middle cell hanging, pick up all the others on one side and roll them in towards the middle.

14) Pull the front portion of the slider out past the nose of the canopy as shown.



15) Do the same on the other side. When you're finished rolling the nose, it should look like the above illustration.

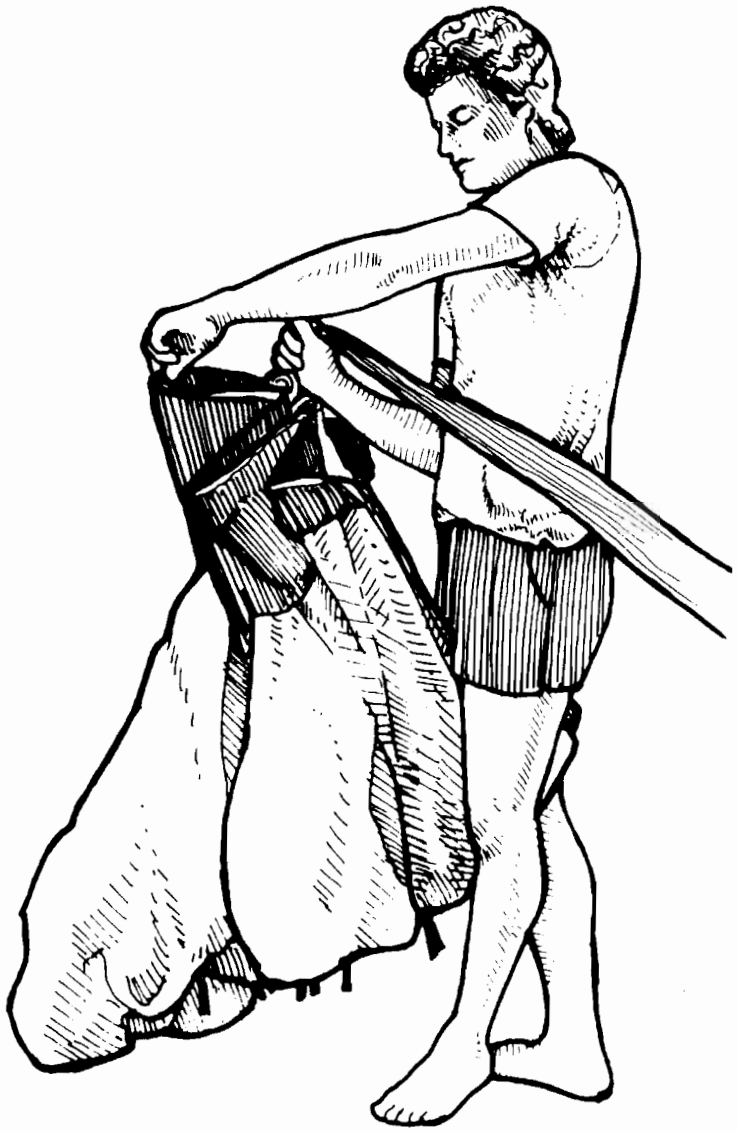
Put the rolled nose between your legs and grip it with your knees to prevent it from unrolling during the rest of the packing procedure.



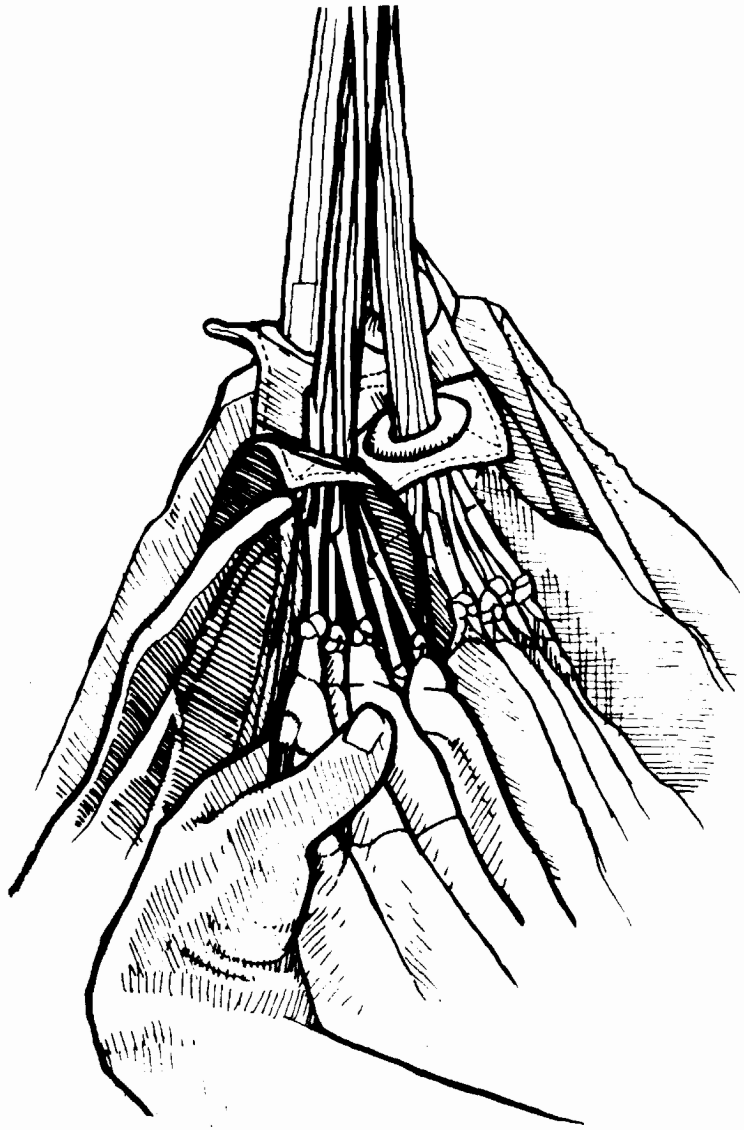
FOR ILLUSTRATION ONLY.
Do not unroll the nose as shown here.

16) This illustration shows how this packing method helps slow down canopy inflation. As the canopy opens (remember, this shows the canopy upside down), the center cell inflates and the sides are slowed somewhat by the fact that they are rolled separately. The result is controlled, symmetrical inflation.

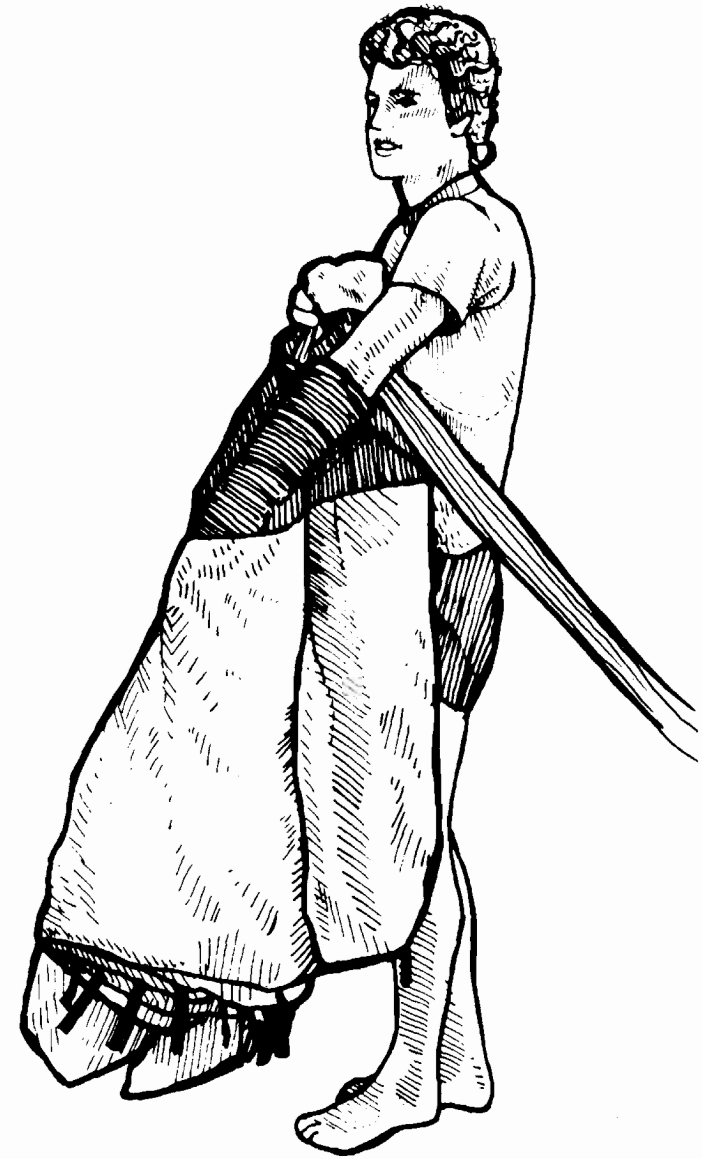
17) If your canopy opens too slowly, then leave the nose hanging neatly flaked; don't roll it at all. This leaves it exposed to the airstream and will help the canopy inflate faster.



18) Clear the stabilizers. Since all the lines are bunched up in the middle, pull each stabilizer panel out one by one until they form an irregular shape resembling the petals of a flower when viewed from the top. Be sure none of the lines are wrapped around a slider stop on a stabilizer.

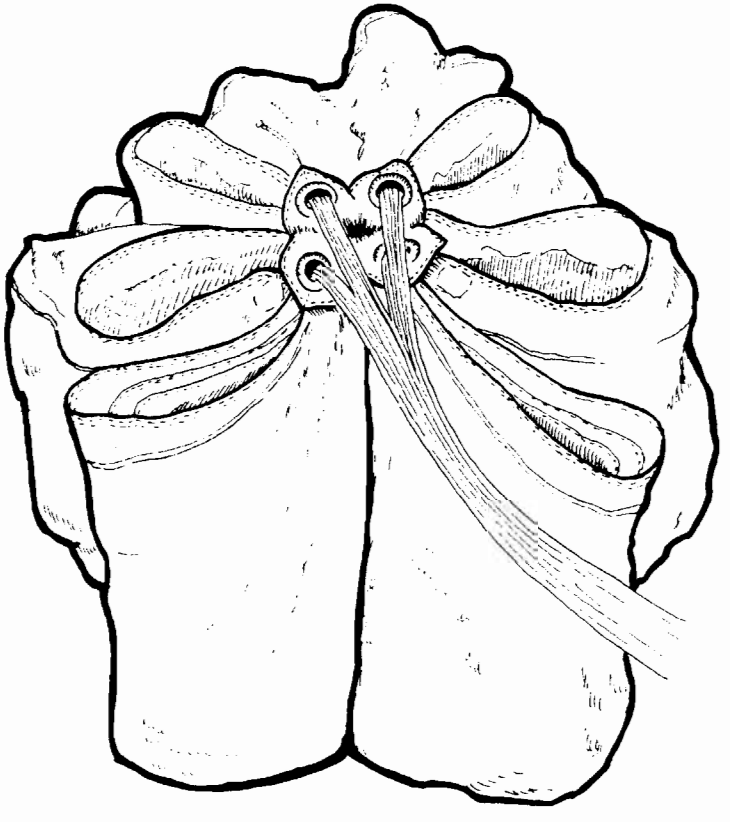


19) Find the group of A lines on one side of the canopy. With the canopy held in front of you as you have it now, the A lines are the front part of the line group that go through the front slider grommets, the ones that should be closest to you.



20) Since there is a lot of fabric between the A and B line attachment points, it is easy to separate the two line groups: Look down inside the first small S fold of the stabilizer and find the "extra" bunch of fabric.

Now make the rest of the canopy into S folds like the stabilizers: Put your hand in between the A and B lines on one side (near where they pass their own grommet) and pull them out to the side. This will give the cells on one side the correct type of flaking. Now repeat the process with the other A and B groups, pulling the fold out to the other side. (If you rolled the nose a lot in steps 12-15, you may skip this A-B S-fold since most of the fabric is probably rolled up in the nose.)



21) Now that you've pulled out the canopy between the A and B line groups, do the same thing between the B and C lines. Pull the fold of fabric between the two groups out to each side. When you look down in between the stabilizer folds after you've done your "flaking," the folds should look neat like this.

22) Now find the D line group, the group of lines nearest the tail. (Not the steering lines, they are attached at the trailing edge.)

Pull the left-hand steering lines off to the left (to get them out of the way). Follow the stabilizer down to the D lines and pick up all the D lines on the left side. If you have a 9-cell canopy, you should have five lines; if you have a 7-cell, then you should have four lines.

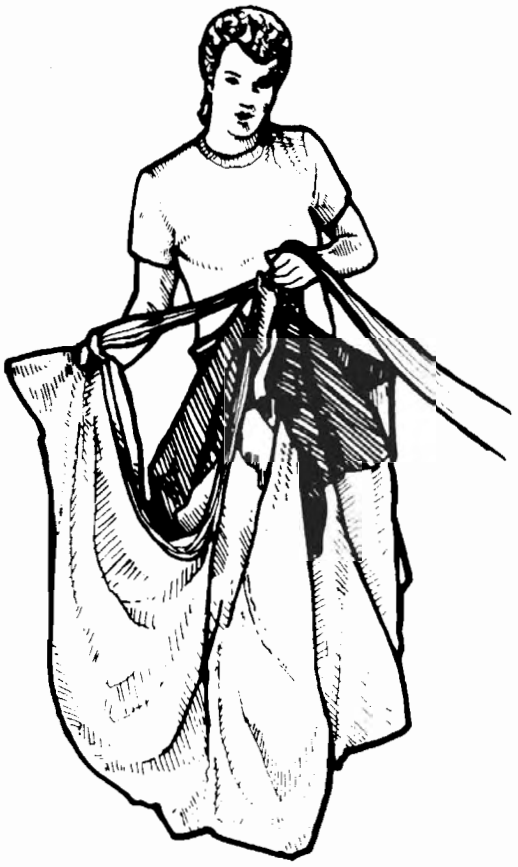
All lines in your hand should go through the same grommet. If they don't you've picked up a wrong line.

23) Now that you are holding only the correct D lines, you may let go of the steering lines. Take the whole D-line group on one side and pull it out gently.

24) Fold the D-line group in with one motion to put a real fold in the fabric between the C and D lines. Do the same thing on the other side.

IMPORTANT:

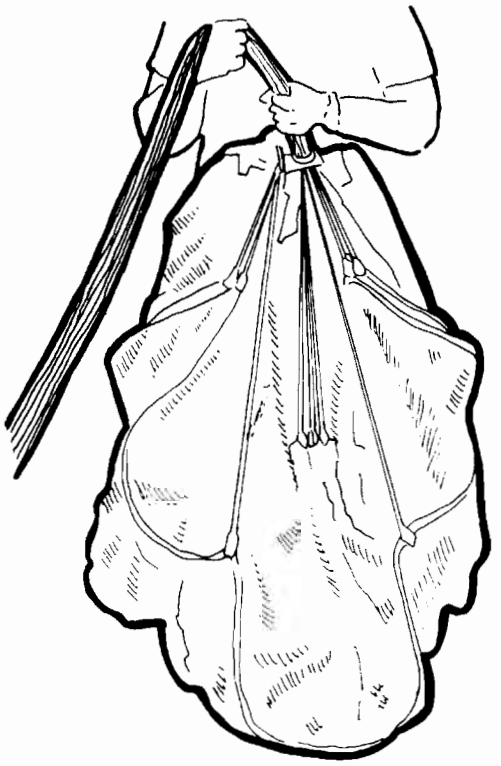
As part of Step 26, be sure the stabilizers and their slider stops are correctly lying outside the suspension lines as described in Step 17 on page 23. Canopy damage is likely if a stabilizer (or its slider stop) lies under a line.



25) Now grasp the steering lines where they attatch to the tail, pull the entire tail out and drop it straight down.

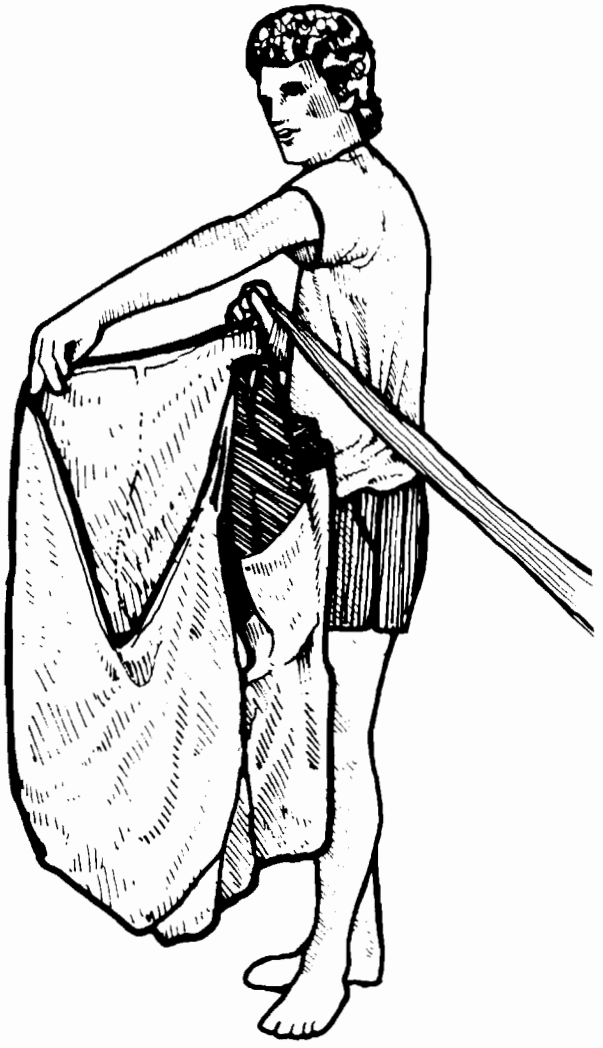
26) Now organize the steering lines and tail so the canopy looks like this.

(Even though it might seem like you've got a disorganized wad of canopy hanging down in front of you, it should actually be a neat pack job.)

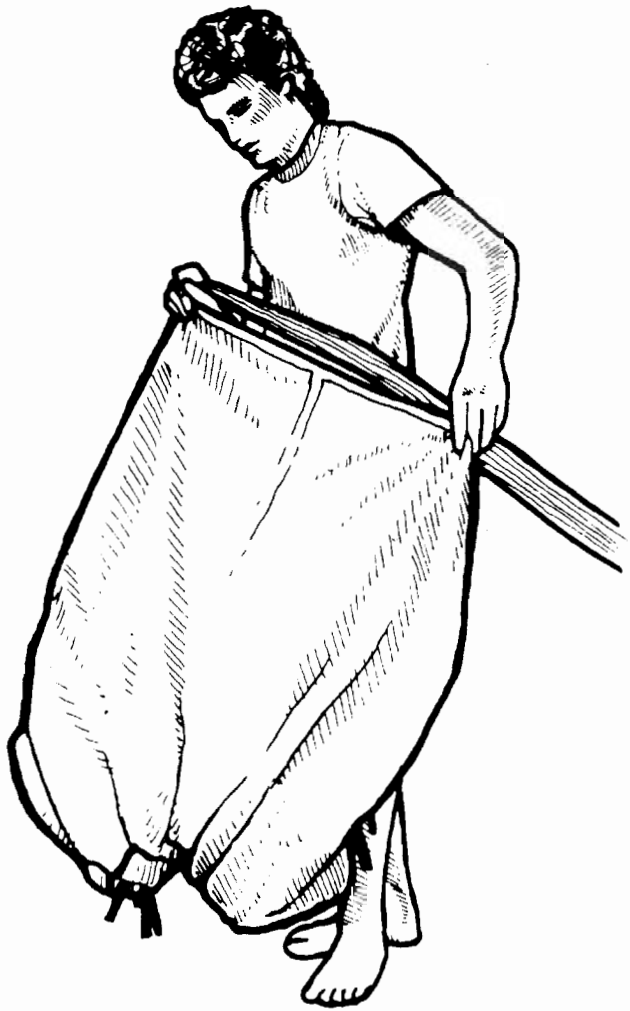


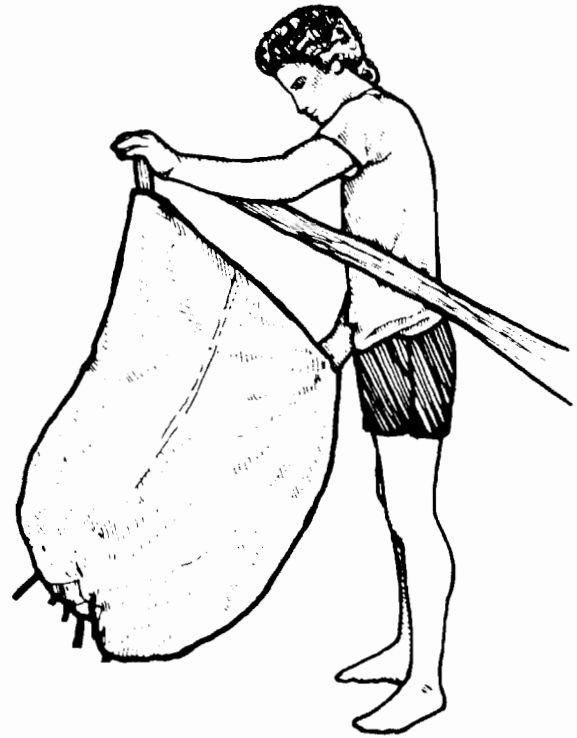
27) Canopies with dual steering lines wil look like this. All other canopies will look like Fig 26.

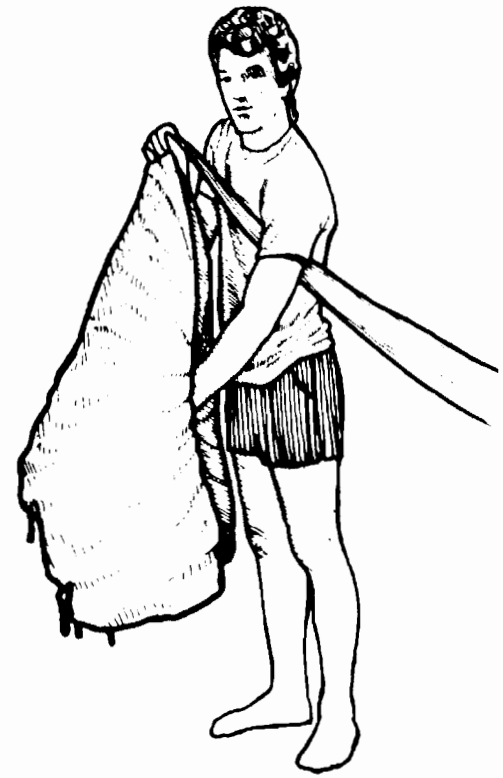
28) Reach down and pick up the very middle point of the trailing edge; an identification marker is sewn at the middle point to help you. Raise the tail a couple inches above the slider and hold it in place with the same hand that is holding the lines.



29) On one side, start with the middle of the tail being held under your thumb and pull the excess material straight out. You're pulling out the trailing edge of the canopy that extends from the inside steering line to the very center of the trailing edge.





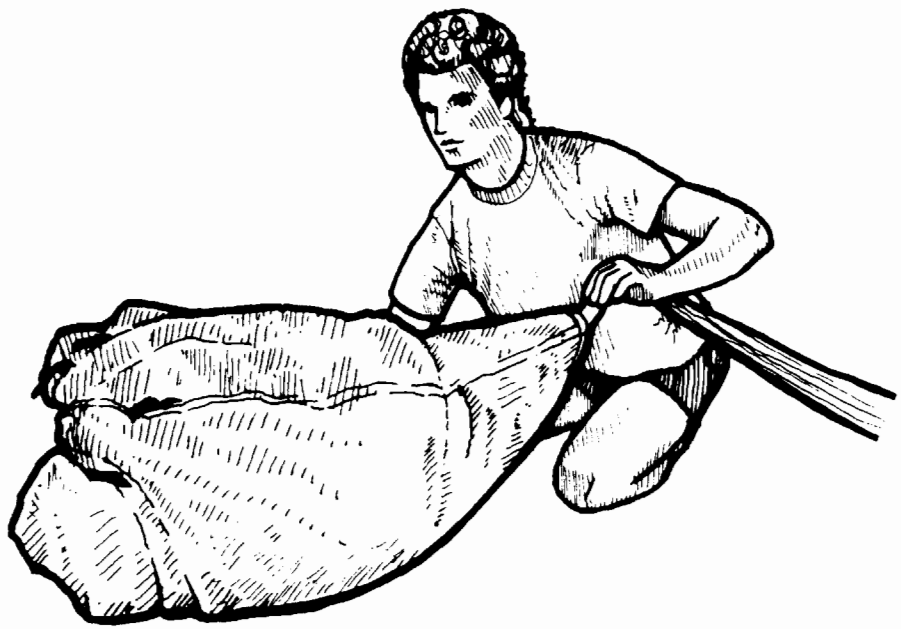


CAUTION:

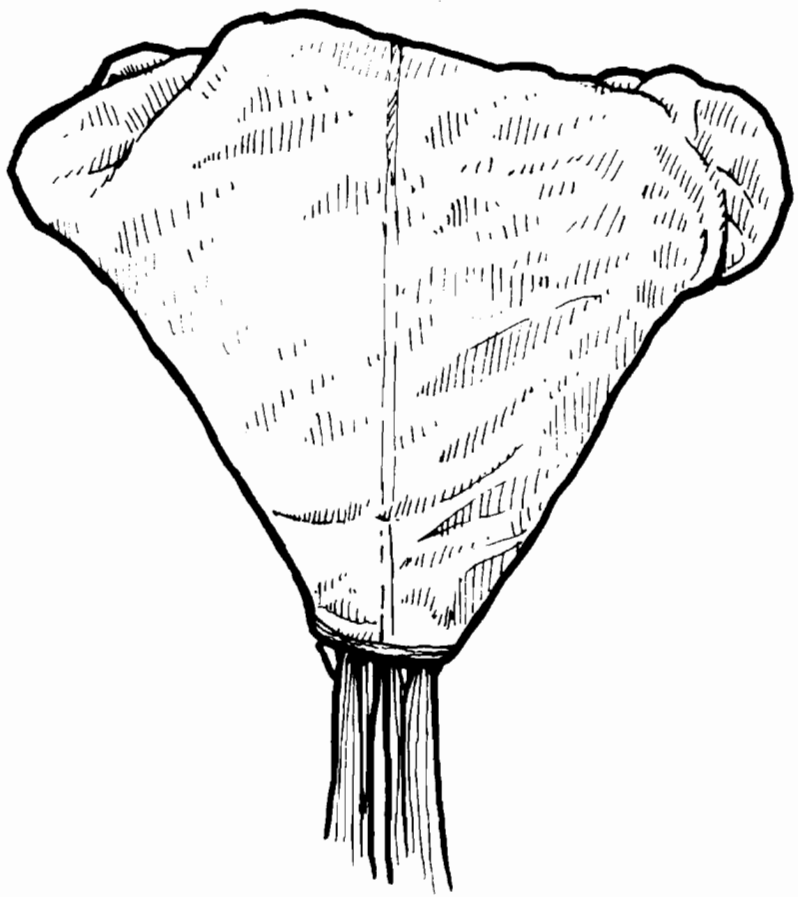
The steering lines must stay positioned at the back of the canopy as shown in Fig. 26. If the steering lines are moved to the nose of the canopy (rather than being kept at the back), a line-over malfunction and canopy damage may result.

30) Wrap that part of the tail half way around the canopy. Hold in place with your knees. Fold the tail on the other side of the canopy the same way.

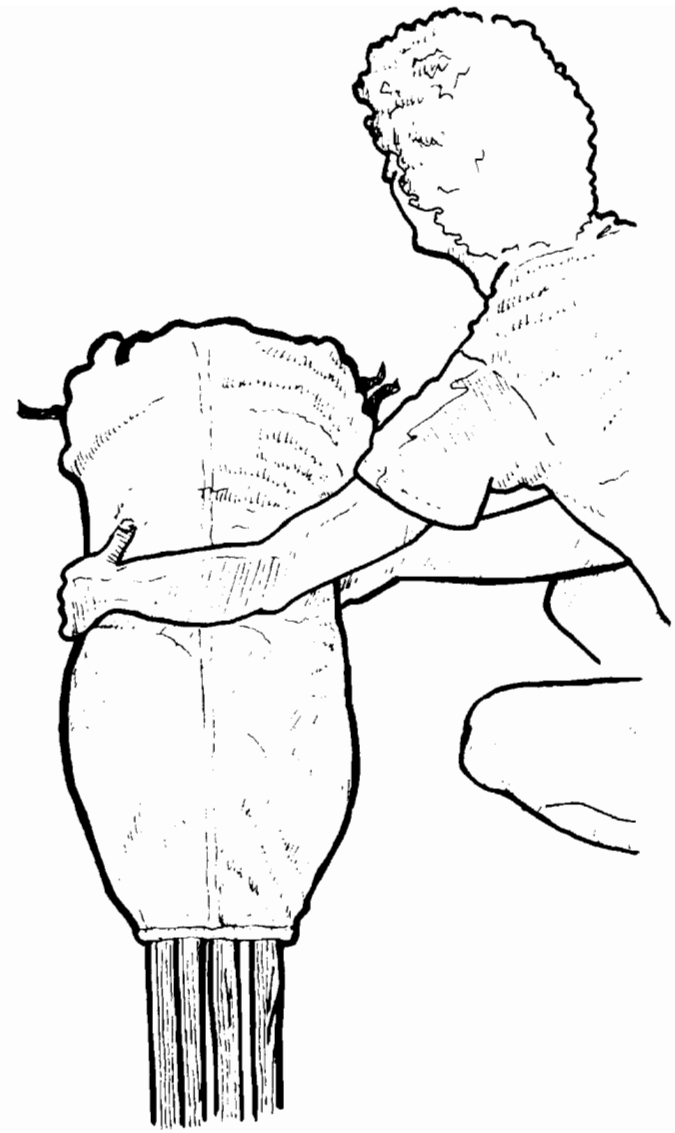
31 & 32) Release your knee grip on the nose and tail. Take both tail pieces in one hand and roll them together in to the middle so they completely encase the rest of the canopy.



33 & 34) Place your free hand carefully under the bundle. Swing it out slightly so that the lines stay taught and gently lay it on the floor.



35) As it lies on the floor, the bundle should be triangular in shape, as shown. Note: The slider should be wrapped up in the tail and should stay that way as you stuff the canopy into the deployment bag.



36) Dress canopy to a width slightly wider than the width of the bag.

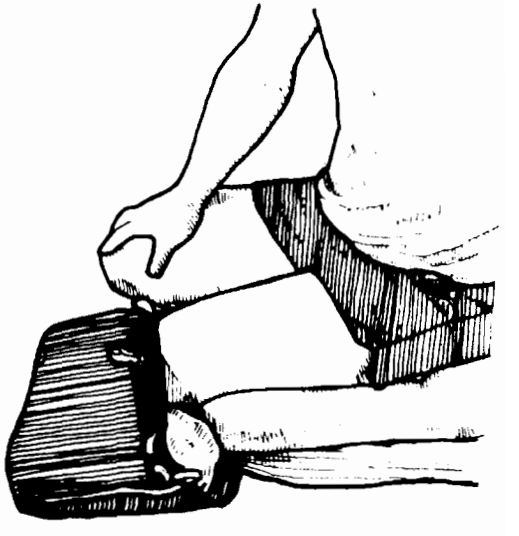
All the slider should stay inside the rolled tail. The slider must not be allowed to move down the lines – even the smallest downward movement of the slider may increase opening shock and decrease reliability. Pay extra attention to the position of the slider until the bag is closed.

37 & 38) Move to the side of the canopy and put one hand right under the slider edge of the bundle. Place the other hand on top a little farther up and make a small S fold as shown.

Be sure the slider stays up against the stabilizers; don't let it move down the lines.

39) Now put one hand under the top of the bundle and make an S fold in the opposite direction as shown. The remaining material can be rolled under the fold.

40) You should now have a neat compact bundle. Try to make the folds so that the bundle is only a little wider than the bag.



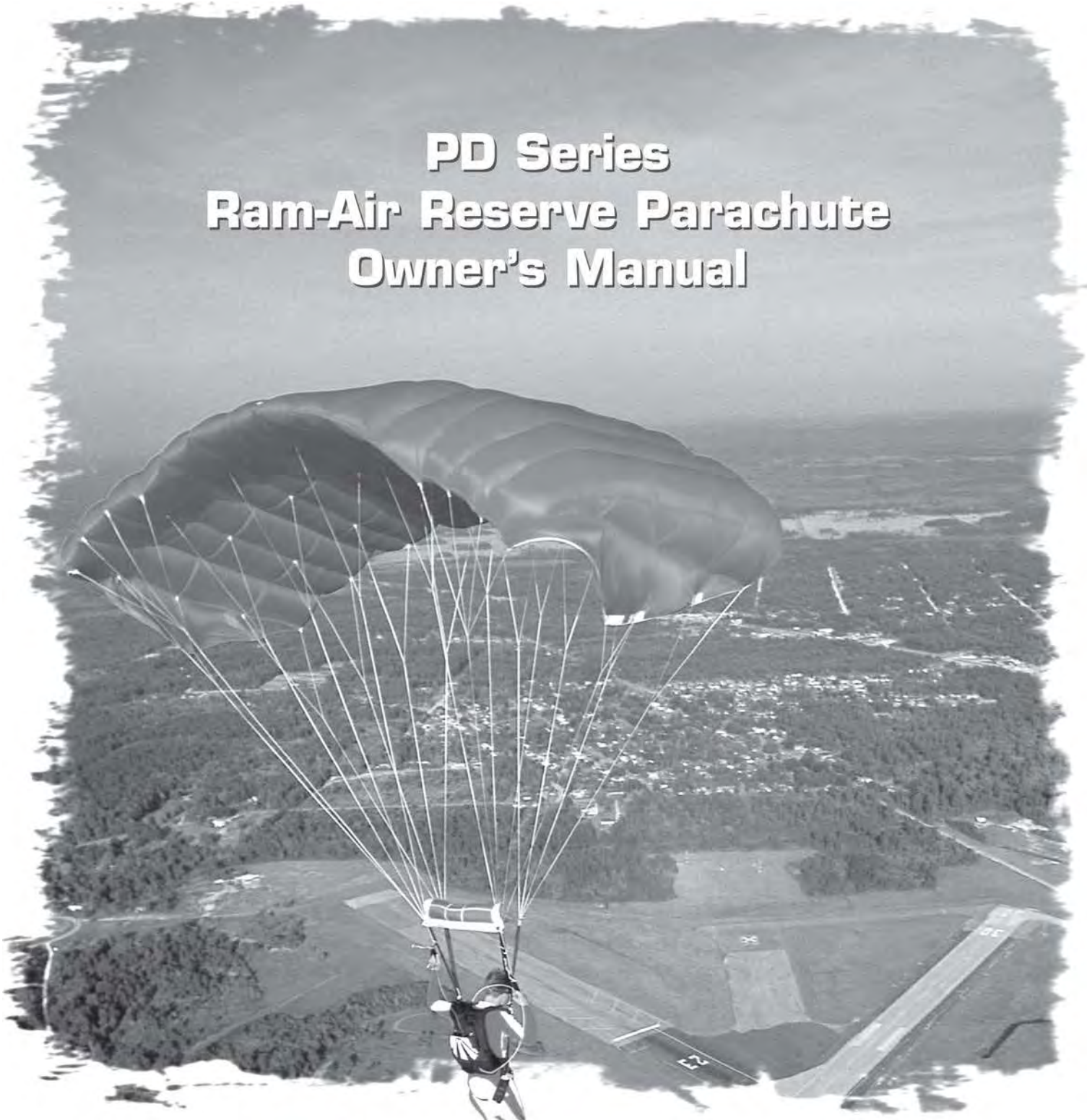
41) Place your knee in the middle of the canopy to keep it together while you pull the bag over it.

42 & 43) With your knee still in place, pull the bag over the canopy one side at a time. Hold the corner of the canopy bundle up while you pull the bag over it, then roll the canopy into the corner of the bag. This helps get the canopy firmly into the corners, making a neater pack job. The whole canopy should be in the bag before you remove your knee.This helps completely fill the corners of the bag by keeping the middle compressed.

Follow your rig manufacturer's instructions for closing the bag, stowing the lines, placing it in the pack tray, and closing container.

It takes practice to pack quickly and neatly, Every jumper has his own "system" to make the job easier, and you'll quickly develop one of your own.

PD Series
Ram-Air Reserve Parachute
Owner's Manual



PD RESERVE

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DOC# MAN-012 REV H

Dear Customer

We'd like to thank you for your purchase of a new Performance Designs, Inc. reserve parachute. We're confident you'll be pleased with it in every way. You'll like its light weight and small pack volume. If you deploy it, you'll be pleased with its quick reliable openings, good flight characteristics and great landings that Performance Designs canopies are known for.

We urge you and your rigger to carefully inspect your new reserve to completely familiarize yourselves with its features and quality workmanship.

Again, thank you for choosing a Performance Designs canopy. With proper care, it should provide many years of service.

Sincerely

Bill J. Coe
President

WARNING: COMPONENT INCOMPATIBILITY, OR INCORRECT CHOICE, INCORRECT ASSEMBLY OR IMPROPER CONFIGURATION OF PARACHUTE SYSTEM COMPONENTS MAY CAUSE SERIOUS INJURY OR DEATH. All components of a parachute system must be compatible with each other to ensure proper functioning of the system. The user is responsible for determining the compatibility and choice of all parachute system components and for ensuring the correct assembly and configuration of all components used in the parachute system. Particular attention should be paid to, but should not be limited to, compatibility of harnesses and containers, risers, pilot chutes, bridles, cutaway systems, reserve static lines, main/reserve activation devices and automatic activation devices (AADs).

READ THIS MANUAL CAREFULLY BEFORE ASSEMBLING, PACKING OR USING YOUR PERFORMANCE DESIGNS RESERVE PARACHUTE.

W A R N I N G

Each time you use this parachute you risk bodily injury and death.

You can substantially reduce this risk by: **(1)** assuring every component of the parachute system has been assembled and packed in strict accordance with the manufacturer's instructions. **(2)** by obtaining proper instruction in the use of this canopy and the rest of the equipment, and **(3)** by operating each component of the system in strict compliance with the owner's manual and safe parachuting practices.

However, parachute systems sometimes fail to operate properly - even when properly assembled, packed and operated - so you risk serious injury and death each time you use the system.

STATEMENT OF COMPLIANCE

The policies contained herein comply with the Federal Aviation Regulations, Part 21.

REVISION LIST

This manual may be revised at any time by Performance Designs, Inc (PD). The only way to be sure this manual is current for your canopy is to check periodically with PD or check www.performancedesigns.com. PD welcomes suggestions of ways to improve this publication. If you feel parts are incomplete or hard to understand, please let us know by writing or emailing PD. This is the Fourth (4th) printing of the PD Reserve Owners Manual. All changes up to the printed date have been incorporated.

DISCLAIMER NO WARRANTY

Because of the unavoidable danger associated with the use of this parachute, the manufacturer makes no warranty, either expressed or implied. It is sold with all faults and without any warranty of fitness for any purpose. The manufacturer also disclaims any liability in tort for damages, direct or consequential, including personal injuries resulting from a defect in design, material, workmanship or manufacturing whether caused by negligence on the part of the manufacturer or otherwise. **By using this parachute assembly, or allowing it to be used by others, the user waives any liability of the manufacturer for personal injuries or other damages arising from such use.**

If the buyer declines to waive liability on the part of the manufacturer, buyer may obtain a full refund of the purchase price by returning the parachute before it is used to the manufacturer within 15 days from the date of the original purchase with a letter stating why it is returned.

PD Reserve Size: PD _____

PD Serial No: R_____

Date of Manufacture:_____

SYSTEM INFORMATION CARD

All Performance Designs parachutes come with a system information card. This card makes important information about the system available to the user. Without this information the user may not be able to determine if the system is suitable for their weight, experience level, opening and landing conditions. Much of this information is placarded in locations where it is unavailable to the user when the rig is packed so this is the primary means of the user being able to assess their ability to use this equipment. This is part of the TSO required placarding on Performance Designs Reserves. The system information card should be kept in the packing data card pocket or in a designated location for operating limitations that is readily available to the user. For Performance Designs canopies the information needed to fill it out can be obtained from the data panels (warning labels) or from the Performance Designs Inc. web site. If other manufacturers products are used you may need to consult with the manufacturer for this information

CANOPY PACKING / DEPLOYMENT LOG

As any conventional ram air reserve is repeatedly handled and repacked, the fabric permeability will increase. This increased permeability will affect opening, flight and/or landing characteristics. To monitor this important issue, we have incorporated a tracking and inspection program into our reserve canopies. Compliance with this program is mandatory. Each time the reserve is inspected and packed, a single diagonal line **** is to be placed in the next open box on the label. In the event of an actual deployment, an **X** is to be placed in the next available box.

The warning label should accurately reflect the repacks and uses on that reserve canopy. In the event a rigger encounters a discrepancy between the packing data card and the warning label, the label should be brought into compliance, just as the rigger would do with any other piece of equipment. The owner of the reserve should be informed that the rigger is simply complying with Performance Designs' requirement for the label to accurately reflect the repacks and/or uses on that canopy.

After 40 repacks or 25 deployments have been reached, the reserve must have its permeability tested. (In most countries, 40 repacks are usually performed over a 10 to 20 year period.) The testing is performed to insure that the fabric permeability has not reached a point where the openings and landing performance would be unacceptable. Subsequent to passing this testing, an additional label is affixed and the canopy is then returned into service. The label will contain additional boxes, the specific number being chosen according to the results of the test.

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GENERAL INFORMATION

- **GENERAL INFORMATION ABOUT THE MANUAL**
- **IMPORTANT INFORMATION TO READ PRIOR TO USE**

GENERAL INFORMATION ABOUT THIS MANUAL

To reduce the risk of serious injury or death, you must obtain instruction in the use of this parachute from a competent and appropriately rated instructor before using this parachute for the first time. It is beyond the scope of this manual to teach you how to deploy, fly, land or maintain this parachute. This manual is only a general guide about this canopy. It does not replace or substitute for proper training and instruction. If there is anything that you do not fully understand, you must get help from a properly rated instructor. Parachute associations around the world, including the United States Parachute Association, publish recommended procedures on learning to skydive and on using skydiving equipment. We urge you to learn and follow these procedures.
Jumping this parachute without first receiving thorough and personal instruction increases the risk of serious injury or death.

Sport parachuting technology and procedures continue to advance rapidly. Although a great deal of care has been taken in the preparation of this manual, Performance Designs cautions that it may contain information that may not be correct or behind the current state of the art of parachute use.

For these reasons, you must use qualified experts - riggers and instructors - to help you inspect, assemble, pack, use and maintain this parachute. Performance Designs recommends that you stay abreast of current techniques and procedures. One such way of keeping updated is to log onto www.performancedesigns.com
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READ BEFORE ASSEMBLY OR USE

Since parachutes are manufactured and inspected by people, there is always a possibility this parachute contains defects as a result of human error. Therefore, the entire parachute system - main and reserve canopies, harness, container and other components – must be thoroughly inspected before their first use and before each subsequent use.

Parachutes get weaker through time for a number of reasons. They are subject to wear during packing, deployment and landing. Exposure to many agents, including sunlight, heat and household chemicals, significantly weaken parachutes. The damage may or may not be obvious. To help minimize the risk of parachute failure and possible serious injury or death, the entire parachute system should be thoroughly inspected at least every year. Parachute associations around the world have laws regarding repack and inspection cycles. Make sure that you are aware of the laws pertaining to you. Inspections must be done by a certificated rigger who has previous experience with this type of parachute.

Your parachute should be immediately inspected if at any time it is exposed to a degrading element. Remember that some chemicals will continue to degrade the parachute long after initial exposure. Regular and thorough inspections are necessary to maintain the structural integrity, reliability, and flight characteristics of the parachute.

Always know the entire life history of every part of your parachute system. That way you will know that no part has been exposed to an agent that may seriously weaken or damage it.

SECTION 2

CANOPY CHOICE

- CHOOSING THE CORRECT CANOPY
- WING LOADING, CANOPY SIZE AND SKILLS LEVEL
- HIGH TEMPERATURES AND FIELD ELEVATIONS
- WING LOADING DESCRIPTIONS
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CHOOSING THE CORRECT CANOPY

It is important for your safety and enjoyment that you match your canopy with your ability and weight. Performance Designs reserve canopies are built in several models and sizes that span a wide range of canopy sizes and operating limits. **There is a specific reserve to match almost any combination of deployment altitudes, weights, skill levels, and landing elevations**. You should read this section very carefully to ensure that this is the correct canopy chosen.

Any canopy's descent rate and forward speed increases as the weight it is carrying, the so called suspended weight, increases. **The canopy also becomes more responsive and reacts more radically when it is stalled or turned.** Penetration into the wind increases, but glide ratio decreases. Because of these aerodynamic facts, it is unsafe to put too much weight under any particular canopy.

If a canopy is too small for you, safe and comfortable landings will be difficult to obtain, even for experienced jumpers under ideal conditions. Less experienced jumpers should be more conservative on canopy size.

The explanations about canopy flight characteristics below are based on landing elevations at sea level. **If you're landing at elevations more than 2000 feet above sea level, you should consider getting a canopy at least one size larger than what you would normally jump at sea level.**

Determining the wing loading of the parachute you intend to jump or buy is a good guide to matching your weight to a particular canopy. **Wing loading is easily calculated by dividing a total suspended weight in pounds by the surface area of the parachute in square feet.** Total suspended weight is the weight of the jumper plus all his clothing and gear, including all components of the parachute system.

The size of Performance Designs canopies is printed on the data panel on the centre cell top surface near the tail. **(Be sure to actually check the data panel; canopies of different sizes may look the same.)**

A typical ready-to-jump sport parachute system (rig and both canopies) weighs 15 lbs (14.5kg) to 30 lbs (29.5kg). Add this, plus the weight of your jumpsuit, clothing and accessories to your body weight to get the total suspended weight.

For example, a jumper who weights 165 lbs (74.8kg) with his jumpsuit on and who jumps a packed rig that weighs 25 lbs (11.35kg) would have a suspended weight of 190 lbs (86.1kg).

Here's an example of how to calculate wing loading of a 210 square foot canopy and the jumper used in the example above:

$$\frac{\textbf{190 lbs}}{\textbf{210sq.ft}} = \textbf{0.9 lb./sq.ft.}$$

Now calculate the wing loading for the main and reserve canopies you intend to jump. Compare the wing loadings of your main and reserve parachutes. Generally, if the wing loadings are similar and the canopies are both of reasonably similar design, the speeds and skill level requirements will be close enough for most experienced jumpers to handle. If they are very different the canopies will fly very differently.

A very important factor is what wing loadings you are used to, so compare the wing loading to the canopies you were previously jumping. **If the change in wing loading is more than 15%, the canopy**

will seem very fast, have a high rate of descent, and be tricky to flare. This situation can be very dangerous, therefore we recommend restricting the change to less than 15%.

You should particularly avoid having a higher wing loading main parachute than you are used to, and a reserve that has an even higher wing loading. Keep in mind that at high wing loadings you have very little time to figure out how to land the canopy even if you open up high. Also consider that when you open your reserve you will probably be at a lower altitude than you are normally open on your main. There is a good chance that you will not make it to your intended landing area. Do you really want to be trying to figure out how to land the smallest, fastest, highest rate of descent canopy you have ever jumped, while landing in an undesirable location?

WING LOADING, CANOPY SIZE AND SKILL LEVEL

We no longer publish one single value for "maximum exit weight", but rather a table including maximum exit weight limits in pounds and kilograms according to canopy pilot skill level. An example of this table follows:

MODEL	MINIMUM	STUDENT	NOVICE	INTERMEDIATE	ADVANCED	EXPERT	MAXIMUM
PD 143R	VLC	N/R	122 lb (55 kg)	143 lb (65 kg)	165 lb (75 kg)	200 lb (91 kg)	254 lb (115 kg)

VLC = Varies with landing conditions. N/R = Not recommended

How are the different categories defined? Although a skill level category system with rigid definitions for each level is not possible, we can say that the range starts from the STUDENT level (first skydive) and goes beyond EXPERT (some of the best pilots in the world), of which there are only a handful. Numbers of jumps is one factor, but not necessarily the dominant one. The type of equipment being used on those jumps is an important factor, as is how frequently these jumps are being made. **An important rule to consider is to limit any change to a smaller canopy size to no more than a 15% size reduction from what you are used to**. In the final evaluation, it is the type and quality of canopy experience that really determines a person's preparedness for a given canopy.

One way to use this chart is to find where you are on the chart, and ask yourself if you should be in that category. For example, if you have a PD143-R and have an exit weight of 195 lbs, we feel you should be an expert. If you consider yourself a novice, then this canopy is probably not suitable for you. You should check this with your main canopy as well. It is important to note that the weights listed under each category are only a maximum for each category, and not a requirement. Many expert skydivers prefer to jump at lower wing loadings than the level shown on the chart, for a variety of reasons.

HIGH TEMPERATURE AND FIELD ELEVATIONS

Landing performance degrades with increasing temperature and altitude. To help compensate for this we recommend that you lower all published weights (except any minimum weights) by 2% for each 1000 feet your landing area is above sea level. In addition you should lower all published weights (except minimum weights) by an additional 1% for each 5 degrees F (3 degrees C) above standard day conditions. Standard day conditions are 59 deg F (15 deg C) at sea level and reduce approximately 3.5 deg F (2 deg C) per thousand feet. It is usually not very practical to reduce your landing weight so you really need to consider this at the time you are selecting a parachute to buy or use. **This is an excellent reason to give yourself a little more margin when purchasing a canopy.** Landing performance also degrades with increasing temperature and altitude.

WING LOADING DESCRIPTIONS

This section describes how canopies typically perform at various wing loadings. **Since your recent experience will affect your frame of reference, this section is only a general guide.** It is still preferable to compare the wing loading of your new reserve to the canopy you have been jumping.

WING LOADINGS LESS THAN 0.45 LB/SQ.FT:

The parachute is too large for you. The canopy will fly very slow, and may not have sufficient penetration, even in light winds. Turbulence will have a greater influence on the canopy. Light turbulence or wind gusts that canopies with higher wing loadings fly through easily may be sufficient to stall or collapse your canopy. We recommend that you do not use this canopy if the wing loading is below 0.45.

WING LOADINGS BETWEEN 0.45 AND 0.7 LB/SQ.FT:

This is a lightly to moderately loaded parachute. This is a good area for students and low experience level jumpers, and for pilot emergency bailout parachute systems when used by a pilot with very little training. The canopy will be relatively slow and docile. It will be easy to land and will not require the very precise flare timing and technique that canopies at higher wing loadings require to get an acceptable landing. However, proper instruction in the use of this canopy is required. When jumping at this wing loading, you will be more limited as to wind speed, wind gusts, and turbulence than jumpers using canopies at higher wing loadings. Even if other jumpers are jumping, the conditions may not be safe for you to jump.

WING LOADING BETWEEN 0.7 AND 1.0 LB/SQ.FT:

This is moderately loaded canopy. If this is a higher wing loading than you are used to, the canopy will fly fast and turn fast. It will require more skill to land well. Small errors in flaring technique that were unnoticeable on a larger canopy will cause noticeable errors on this one. It will also be more difficult to land in confined landing areas. Be sure your skill level is up to the demands of this situation.

WING LOADINGS BETWEEN 1.0 AND 1.4 LB/SQ.FT:

This is a highly to very highly loaded canopy. A high experience level is required to get an acceptable landing, even under ideal landing conditions. If this is a higher wing loading than you are used to, the canopy will fly and turn very fast. A precisely timed dynamic flare will be required to get the rate of descent to an acceptable level. Your forward speed may be high when you actually land. Stalls will occur at relatively high flight speeds. It will be difficult to land this parachute in confined areas or at high altitudes.

Also keep in mind that if you are rendered unconscious and an AAD opens your reserve, you may still suffer severe injuries or death due to uncontrollable landing.

Performance Designs recommends a minimum of 300 jumps on ram-air canopies, and at least 50 jumps on a canopy no more than 15% larger than this reserve, before using a reserve in this wing loading. If you choose a canopy at or above these wing loadings, you must realize and accept the additional risks involved in use of the canopy.

WING LOADINGS ABOVE 1.4 LBS/SQ.FT, AND BELOW THE MAXIMUM SUSPENDED WEIGHT:

This is a very high wing loading. **Turn rates, forward speed and rates of descent will all be very high.** A very high experience level is required to get an acceptable landing, even under ideal landing conditions. Control range may be very short, with stalls happening very abruptly, with little warning. This situation can be very dangerous. Performance Designs advises all jumpers, regardless of experience, that it is safer to choose a lower wing loading than this level. However, Performance Designs recognizes that there are a few individuals that have a great deal of experience and skill flying a main parachutes in this wing loading, and are determined to use reserves in the same wing loading. **While this is legal (if the conditions below are met), it is very hazardous.** There are relatively few jumpers that are capable of handling this situation. **At a minimum, jumpers must meet the follow requirements:**

../ At least 500 ram-air canopy jumps and at least 100 jumps on a ram-air canopy that is no more than 15% larger than the reserve parachute

-or-

../ Have an endorsement in their log book from an instructor who has the proper ratings issued to them by their countries governing association stating that:

- The jumper has been given instruction in high wing loading canopies.
- The maximum wing loading the individual has demonstrated that they can safely handle.
- The wing loading for the reserve parachute must not exceed the maximum demon strated wing loading

These are both FAA (USA) and Performance Designs requirements that must be met for you to be legal. Other countries throughout the world may also enforce these limitations. Even if you meet the level requirements this is a very dangerous situation. The landing conditions, weather, or your skill level may make this even more dangerous. **Severe injury or death may result**. Also keep in mind that if you are rendered unconscious and an AAD opens your reserve, it is very likely that you may suffer severe injuries or death due to an uncontrolled landing. For these reasons, we recommend that you get a canopy with a lower wing loading.

The absolute maximum suspended weight for the canopy is the absolute legal limit. There are no situations where it is permissible to exceed the maximum suspended weight for the parachute. Structural failure may occur if you exceed these limits. By exceeding the absolute maximum suspended weight you risk serious injury, death, equipment failure, and FAA violations or fines.

FLIGHT CHARACTERISTICS

This section is intended to give you some hints on how to fly your reserve. This is not a substitute for proper training. **Performance Designs recommends that you obtain proper instruction on the use of your parachute system before using this canopy**. In the U.S.A. you should use a United States Parachute Association rated instructor. Other countries have similar associations for approving instructors.

Even if you are familiar with ram-air parachutes, including Performance Designs canopies, your new reserve parachute may handle differently. **Like most 7 cell main canopies, the PD 7 cell reserves generally have a higher rate of descent and a lower glide ratio than most 9 cell main parachutes at smaller wing loadings.**

BASIC INSTRUCTION FOR LOW WING LOADINGS

The following is intended to be a supplement to proper instruction on the use of this parachute from a qualified and appropriately rated instructor. This is not a course of instruction.

In the event of the deployment of your ram-air reserve, check your altitude. If there is sufficient altitude, prepare your canopy for flight as follows:

O Release the brakes. On most systems this is accomplished by pulling down on the toggles. Note that if only one brake releases, the canopy will enter a turn. Depending on the size and wing loading the turn can be quite fast. In the rare event that there is difficulty releasing one of the brakes, the turn should be stopped by continuing to pull down the side that released until the turn stopped.

O If necessary at this point, the slider may be pumped down by pulling both toggles down to your waist and holding them there for few seconds and then raising them back up. If any cells are closed, this action should open them. You may have to repeat this action two or three times.
Again, perform the above procedures only if there is sufficient altitude. It is better to make a smooth flared landing with collapsed end cells than to land while pumping the toggles to clear them

O Next look for the best landing area you are sure you can reach. Keep in mind that your reserve may not glide as far as your main parachute. Your opening altitude will probably be lower than normal under your reserve. The sooner you look for a landing area the more places you will have to choose from. Immediately turn toward your intended landing area.

O If there is enough extra altitude after reaching the landing area, try some practice flares in the air. Note the control range and how the canopy stalls. If you flare too much you may stall the canopy and hit the ground unusually hard.

O Always fly a conservative approach for a first-time landing on any canopy. Set up your final approach to landing higher than normal. Avoid turns close to the ground. Remember this canopy probably flies very differently than the one you are used to. It may lose a lot more altitude in a turn than you